AN

OUTLINE OF LOGIC,

FOR THE

USE OF TEACHERS AND STUDENTS.

BY THE

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PREFACE.

I HAVE found so much inadequacy, and so many inaccuracies, however trifling, in the first edition of this book, that it has seemed to me desirable to put forth a new one. The aim of the work is to supply what strikes me as a want among our books of education. There may, I think, be cases in which the teacher would wish to communicate some knowledge of the general principles of Logic, and yet be at a loss to find the precise kind of manual of the subject which will suit his purpose. The brilliant work of Archbishop Whately, full as it is of fascination and suggestion, has done more perhaps than any single book in our time to stimulate the study in England; but I suppose it will be very generally allowed that it is both inadequate and inaccurate to such an extent as greatly to mar its usefulness as a Class Book. Mr. Morell's Handbook, small as it is, will teach at once much more and much better Logic; but it is so mere a

skeleton that the teacher must be a student of the science himself in order to fill up the outline, and make it interesting to his pupils. The works of Archbishop Thomson, of Mr. Chretien, and of Dean Mansel[1], while they are based on better principles than that of Mr. Mill, take rank with it in range and depth, and therefore are out of the question here; while the writings of Sir W. Hamilton and Mr. Baynes[2] are available to none but zealous students. Mr. Fowler's *Deductive* Logic came out about the same time with the first edition of the present work, and had not been seen by me when I wrote this Preface. Valuable as it is, I do not find that it either meets my aim, or supersedes my endeavours.

There seems room, therefore, for a book of accessible and available dimensions, which shall at once trace the outline of pure Logic, and pause long enough on its details to suggest their significance and importance. I have not myself met with such a book, and have here endeavoured to supply one, with what success I must leave others to judge: if my efforts have not been quite futile, I may hope that some, both teachers

[1] I refer not merely to Dean Mansel's Prolegomena, but in more direct connexion with Logic, to his Notes to Aldrich.

[2] I must except, however, Mr. Baynes's translation of the "Port Royal Logic," which will be found most serviceable to both teacher and learner. I may also mention an ingenious little book on Logic by Mr. Shedden, with which I became acquainted last year.

and learners, may have their conceptions cleared, and their range of mental vision extended, by the perusal of the following pages.

As I aim at assisting the teacher who may not himself be an advanced Logician, I venture to throw out the following hints. Such a Manual as the present will not supersede the necessity of continual illustration on his part, nor make it otherwise than desirable to task to some extent the faculties of his pupils. In the First Part of Logic the subjects of Division and Definition will give abundant scope for exercises in both; in the Second, questions of Elocution, Emphasis, Literary Criticism, and Rhetoric in general may be easily and advantageously introduced; while in the Third the learner may gain much from being made to exhibit Discourse, as it presents itself in all varieties of his reading, in its pure and naked form.

The aim of this little book of course exempts it from treating the more difficult questions connected with the science, and should on the whole preclude the writer from taking part in Logical controversy. I have not, however, been able to refrain from giving my own opinion on some points belonging to the latter, I trust with reasonable modesty. I have also ventured to depart somewhat from generally-received arrangement. It seems to me that the questions of Quantity and Quality belong in the first instance to

the First Part of Logic, and that till we have considered these in reference to Concepts and Terms, we are at sea regarding their bearing on Judgments and Propositions. On the same principle I have introduced the subject of Induction into the Second Part, because I think that the difference between Inductive and Deductive reasoning resides in a particular kind of Proposition, the appearance of which in the Syllogism constitutes the former.

In this Edition I have also given views hitherto, so far as I know, my own of *à fortiori* reasoning, and of the quantities *many and few*. These latter have been much overlooked by Logicians.

My attention was directed to the opposition of singulars too late for conveniently dealing with it in the body of my work. I have therefore said a word or two upon it in Note F, under the head *Diametrically opposite*. I have forborne to treat of *Fallacies*, the *nosology* of Logic, because right Logic is the true precaution against them, and of *Method*, because I hold with Archbishop Thomson that it is the due application of the whole, not a separate part, of the science.

The "Supplement to the Preface" which accompanied many copies of the first edition is omitted now, not because I have changed my opinion on the questions to which it relates, but because the reasons in the text which called for it no longer exist.

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ERRATUM.

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the last age, however, a marked reaction has taken place. German transcendentalists and democratic Benthamites are both seen occupying themselves with this old pursuit of the schools, which indeed never lost its honourable place in the country of the former, while the works of Archbishop Whately, Mr. Mill, and, far above these, of Sir. W. Hamilton, have given a new impetus to the study, of which the effects are probably by no means exhausted hitherto. Logic is, therefore, no longer a neglected science; and being no longer

PART III.

ON SYLLOGISM.

ELEMENTS OF LOGIC.

INTRODUCTION.

THERE is no object of human pursuit which has been more variously estimated in these latter ages than Logic. After submitting themselves to its despotic sway, men turned with revolutionary violence upon their tyrant, and not content with dethroning him, must needs heap contumely on him likewise. The absolute uselessness of Logic was for some time supposed to be the negative expression of the Baconian Philosophy; and the pursuit of it, except as a traditional observance at Oxford and one or two other universities, considered wholly obsolete. Even in them the pursuit was not unfrequently accompanied by protestations of its all but complete inutility. Within the last age, however, a marked reaction has taken place. German transcendentalists and democratic Benthamites are both seen occupying themselves with this old pursuit of the schools, which indeed never lost its honourable place in the country of the former, while the works of Archbishop Whately, Mr. Mill, and, far above these, of Sir. W. Hamilton, have given a new impetus to the study, of which the effects are probably by no means exhausted hitherto. Logic is, therefore, no longer a neglected science; and being no longer

neglected, we must presume that its pursuit is felt to be profitable. What is that profit? Was it a mistake in the past generation of experimentalists to deny that there was such profit? Were the schoolmen right in opposition to them? Or may there not be a third view, which does justice to the claims both of Experiment and of Logic?

I believe the question of the utility of Logic to be very much bound up with the question of its definition. My readers may be aware that it has been much disputed whether it is an art or a science. Now he who believes, with Dr. Watts, that "Logic is the Art of using Reason well in our inquiries after Truth, and the communication of it to others[1]," will pretty soon become sceptical as to the possible success, and therefore the value, of any single art with such an aim. Even if, in opposition to Watts, he limits reason to reasoning, he will scarcely believe in the possibility of teaching men to reason well; for a very little observation will convince him, that while no man does so who has not an accurate notion of the terms which he uses, every man does so who has such a notion, and is honest in his use of them. And this being so, he may begin to perceive that whatever value Logic possesses, belongs to it not as an art, but as a science. As we do not study astronomy in order to make or to set in motion the heavenly bodies, but in consequence of their existence and their motions; as it is because stars and planets exist, that we think it well to know what we possibly can about them; even so, we do not study

[1] Watt's Logic, Introduction, p. 1. Dr. Watts tells us in a note that "the word Reason in this place is not confined to the mere faculty of reasoning, or inferring one thing from another, but includes all the intellectual powers of Man."

Logic to make men reason, but in consequence of their reasoning. Seeing that the human mind must go through the discursive process; seeing that there are conditions which secure the right performance of that process in every man, and the absence of which vitiates that process in any man, we think it worth while to know what we can about that process and those conditions. All knowledge is desirable as such, and irrespectively of its results; and, therefore, every science truly such is its own justification. There are branches of knowledge in high and deserved repute, which are not wholly destitute indeed of utilitarian results, but the arduous pursuit of which would be difficult to justify merely on the ground of those results. Surely no one would imagine that astronomy stands in need of the help which it has given to navigation and geography to vindicate the labour which it demands of its votaries; such as the toil which they have expended in estimating the weight of a planet, or catching the almost infinitesimal parallax of a fixed star. And so, I suppose, of the higher parts of optics. The utilitarian gain that comes from the nobler sciences ever comes collaterally and accidentally. It would never have come at all had not men betaken themselves to those sciences on other grounds and from other motives; had they not become enamoured of knowledge for her own sake, and felt that she was herself worth far more than all that she could give besides herself. "Learning is a proud mistress who will not be courted for her dowry, but demands disinterested love from her votary before she will reward his suit."

"Et tamen (ut verum omnino dicamus) quemadmodum luci magnam habemus gratiam, quod per eam vias inire, artes exercere, legere, nos invicem dignoscere

possimus, et nihilominus ipsa visio lucis res præstantior est et pulchrior, quam multiplex ejus usus; ita certe ipsa contemplatio rerum, prout sunt, sine superstitione aut impostura, errore aut confusione, in se ipsa magis digna est, quam universus inventorum fructus." Nov. Org. I. cxxix.

On these grounds Logic, like every other science, is its own justification. Seeing that its object exists, has been called into being by God, it must be worth studying—worth studying, if only because one of His works, even if it were not, as it is, among the very noblest of them with which we are acquainted. That object may be stated as Formal Thought[2], by which terms are excluded all operations of Mind which do not take distinct and definite shape, such as intuitions, will, and emotions. By Formal Thought we mean all such thought as we can weigh, measure, and define; all such thought as has an exact counterpart in outward utterance. This is the object of Logic; and this, I say, is worth studying on its own account. At the same time, as light is in most cases not merely of illuminating, but of quickening power, so science is seldom without utility; and I shall be disappointed if the following pages fail to convince the reader that Logic has a most important bearing on many other pursuits, and is thus a profitable study as regards them, independently of its intrinsic merit.

[2] Sir William Hamilton defines Logic as "the science of Formal Thought." Of course, like many other sciences, it has an Art for its handmaid; an Art, however, which has lost the greater part of any value it may ever have had, not because of men's turning their attention to other than logical pursuits, but because of discoveries and advancement in the science of Logic itself.

Logic is then the science of Formal Thought, and differs from other branches of Mental Philosophy, as in other respects, so in this, that Formal Thought being capable of adequate outward expression, its science is objective as well as subjective. We have in language or notation a distinct object before us, our view of which we do not interrupt or impair by the act of contemplating it. In psychological inquiry we lose the object for the time whilst we investigate it. In the very act of considering and analyzing an emotion, we send the emotion away. Again, other branches of Mental Philosophy are subjected to the reproach of being inexact and variable, according to the varying tendencies of various philosophers. Their results, it is said, are but matters of opinion, and, for the most part, each philosopher has his own opinion upon them. Granting this, which is more than I am prepared to do in the full extent of the statement, I do not admit it to be matter of reproach, or consider the value of those inquiries to be done away with by the circumstance. But Logic, at any rate, is safe from the charge. Coming into outward and cognizable form, it is capable of being, and is an exact science—the most exact, indeed, of all the sciences. It has no weak point, requires no assumption any where, stands in need of no extraneous aid. From first to last, all is self-evolved, all necessary. And it is not only a science, but it is, in a true sense, the science of sciences. From it alone do we gain the idea of science at all,—a branch of study being or not being a science, exactly as it does or does not fulfil the requirements of Logic.

As the science of the λόγος, i. e. of man's Formal Thought, Logic has for its business to analyze the whole process of such Formal Thought, from the first

cognizable beginnings and elements of its activity, to their great result of discourse or reasoning. I say, of its activity, for the logician as such is not concerned to account for any of those antecedent conditions without which there could be no such activity. He leaves to the psychologist to give what explanation he can of sensation, of memory, and perception, and taking the human mind as already furnished with these necessary equipments, he proceeds to consider what it does with them. The process of human thought, in the human being thus furnished, divides itself into the three following heads, which form the three parts of Logic:—

I. Apprehension or Conception. The acts of this faculty are called Concepts when viewed in the mind, and Terms when expressed in words or notation.

II. Judgment. The acts of this faculty are called Judgments when viewed in the mind, and Propositions when expressed in words or notation. Judgments or Propositions are constituted by the comparison of two Concepts or Terms.

III. Discourse, Reasoning, or Syllogism, the comparison of two Judgments.

Of these three parts of the science, it is plain from what has been already said, that the first and second are necessary steps in our progress to the third. Over and above this consideration, however, they have each an independent interest and value, as well as a separate bearing on separate extra-logical pursuits, the first part having, as we shall see, a marked reference to natural history, and the second lying at the foundation of grammar, elocution, and much of literary criticism.

We must now proceed to the study of each of them in its order.

PART I.

§ 1. OF CONCEPTS OR TERMS.

THE first notion of man, as of any other animal, must be that of a being who is the subject of sensation. But it is easy to see that our sensations would be meaningless, unless they gave birth to Perceptions; and equally easy to see that Perceptions would in their turn be just as meaningless, unless they gave birth to Apprehensions or Concepts of the things perceived. Here we come to the first active manifestation of Mind; for Perception cannot, I think, be regarded as such, being a process rather undergone than performed. By this I do not mean that the one is voluntary, and the other the reverse; for Conception, in the vast majority of cases, is as involuntary as Perception. But it belongs to the region of the Mind's activity; it is the first stirring of Thought. Let us now ask what it is.

I perceive something, and my mind cannot be contented with merely perceiving it. It must exercise itself upon it—it must pronounce, however imperfectly, what it is; it must name it. When it does this, it not merely perceives, but it apprehends or conceives the thing, and if the concept thus formed be expressed, there is then employed a Term. I perceive a certain extended amount of bark and foliage; I conceive or

apprehend it as a tree; I call it such, and thereby use the term tree. It is obvious that doing this with our perceptions is the first act and necessary condition of Formal Thought. Now, we can only apprehend or conceive things according to certain fixed laws, under which all objects are necessarily viewed and arranged by us. The act of Conception involves the looking at the object before me, in reference to certain points which it has in common with other objects known to me. To produce a concept there must be this comparison. I cannot answer the question what the thing is without making such comparison; I cannot denote it without such comparison. I cannot call the extended amount of bark and foliage which I perceive a tree without a reference to other similar extended amounts of bark and foliage, which are called trees, and so referring that before me to the same class. All conception involves the process of referring the object to its genus or kind. All common names are the outward expression of this process, and are termed in Logic Universals. It is obvious, in accordance with what has been said, that I have gone through the process whenever I employ the indefinite article. I cannot speak of a tree without having in my mind the genus tree. And it will, I think, be equally obvious on consideration, that there can be no concept or term whatever without this process of generalization. For if I conceive an object as a mere unit or individual, I am indebted for the concept to the notion of the class in which it is an unit. To conceive an unit I must consider the object something, and to consider it something, to have any answer whatever to the question what it is, I must refer it to a class, it may be to a very large and vague one, such, for example, as

mere materiality; but still to a class of some sort: otherwise the object will be merely perceived, not at all conceived either as one or as many.

It will now be easy to see that this combined process of Abstraction and Generalization, by which we separate from all that is individual and peculiar the characteristics which are common to one object with other objects seen by us or known to us, is one which we must be continually performing in all our cognizable thought and utterance. I have already said that we cannot use the indefinite article without performing it. I add, that we cannot attach an adjective to a substantive without performing it. For every adjective is the expression of a quality, and every quality is an Universal, a class. Thus, if I saw a single rose for the first time, and had never seen any thing else that was red, it seems impossible that I could either conceive or denote the quality red; but having seen other things resembling the rose in this respect, I am aware, on looking at it, of the resemblance, and accordingly I class it with those other things in virtue of the resemblance. I say that the rose is red, thereby meaning that it belongs to the class of red things. And not merely adjectives, but adverbs too, will be found on consideration to be the results of the process before us, and to be class terms.

The reference, therefore, of perceived objects to the genera under which they may be ranged is necessary to our conceiving them. But if the act of conception be, as we have considered it, the mind's answer to the question what the perceived object is, it is plain that in the mere reference to genus we lose as much as we gain in regard to this inquiry. For in such reference there is involved a subtraction of every thing character-

istic of the object, except what it has in common with other objects in the same genus. And hence we are wont to speak of mere generalities as unsatisfactory, as not amounting to determinate and fruitful knowledge. Is there then any remedy for this? Without generalization we conceive nothing of a perceived object, and therefore know nothing of it. By mere generalization we lose a great deal of the object. Is there any process in conception which holds the balance between the barrenness of mere generality and the shapeless insignificance of mere perception? Happily for human knowledge these questions are to be answered in the affirmative.

When I have referred the object before me to its genus, my mind does not stop there. I go on to ask how it is to be distinguished in that genus. If I find in it distinctive class marks which stand out from the whole genus, I have referred it to its species. I have found the εἶδος, species, form, or aspect under which it cognizably presents itself to me. Till I had seen it as one of a genus, I had no conception of it at all; it stood forth as but so much unshaped perception. When I had referred it to its genus, I had in the very same act stripped it of a great deal which it presented to my perception; but so soon as I have distinguished it in the genus, i.e. found its species, I have redressed the evil, I have answered the question, what it is?—the object now stands forth known and defined.

Our concepts, therefore, of perceived objects do not stop short till they have found their species. When that has been done, they have answered the question which conception proposes to itself, what the object is? They have determined and defined the object.

It is not here intended that every conceived object

is always ranged under the same species. Such object manifestly gives birth to a variety of concepts. The book before me is conceived in one way when I call it a book. Book is in this case its species. But I may think of it as a particular kind of book, and Treatise, Drama, or Poem may thus become its species. Or I may think simply of its geometrical shape, and parallelopiped is the species now.

And not only so, but even when we are, so to speak, in the same plane of conception, there may be many species. For that which is a genus in reference to the species which it contains, is a species in reference to a more extensive genus in which we find that it is itself contained. Felis catus, the common cat, is a species of the genus Felis. But Felis itself becomes a species when it is referred to a more extensive class of animals, such as the Feræ or the Digitigrades. The technical language of Natural History does not, indeed, in this latter case call it such, convenience dictating a separate term for each step in extension, and the naturalist accordingly speaks of species, genus, order, and class. But every class is a logical species when it is seen to be ranged under one more extensive than itself, which is then regarded as its genus; and every species is a genus in reference to whatever less extensive species it may be found to contain.

There is but one species in the range of extension which cannot be a genus, and but one genus which cannot be a species. The least extensive species, called the *infima species*, that which contains only individuals, cannot, however viewed, become a genus. The most extensive genus, that which is not contained in another called *summum genus*, cannot, however viewed, become a species.

Of these, the infima species presents itself to us continually, and the determination of it is almost the aim of much of our research and inquiry. It receives, because of its freedom from the abstract and general, the title of εἶδος εἰδικώτατον, the most especial species: the species that is most perfectly such. The genus Felis is, as we have seen, a species when ranged under some more extensive genus, such as the Digitigrades or the Feræ; but a single species of Felis, such as Felis catus, the common cat, is a more especial species, more determinate, and it contains only individuals, the individual cats who belong to it. This, therefore, is an infima species.

What, however, we are to regard as the infima species will depend on the mind's purposes at the time of conception and reflection. According to the general aim and view of the zoologist, Felis catus is an infima species; but if we leave that particular notion of species on which he takes his stand, we may call that species which he terms variety; and tortoise-shell cat, black cat, &c., will become species, and infimæ species, if we find no class contained in them, but only individuals.

Although, however, the determination of the infima species will thus vary with the mind's varying aim, we are, as I have said, continually presented with such species in unstinted number. It is otherwise with that which stands at the other end of the scale, the summum genus, γένος γενικώτατον. There is but one absolute summum genus—the universe, existence. We may, however, consider something less extensive as the summum genus for our purpose at the time. The whole subject-matter of conception becomes what has been happily called "the universe of thought," whilst

we are engaged with it. If zoology be our universe of thought, then animal is the while our summum genus; if a branch of zoology be our universe of thought, such as ornithology, then bird becomes the summum genus, and so on.

There is thus a range of conception from infima species up to summum genus, the steps of which are capable of indefinite multiplication, and each step is genus in respect of that below, and species in respect of that above itself. These intermediate steps, at once genera and species, are termed Subalterns.

§ 2. WHOLES OF EXTENSION AND WHOLES OF COMPREHENSION.

To determine species is the great effort of conception, and the great aim of most, if not all science[1]; and this, as may be already apparent, cannot be done without previous generalization. The subject, therefore, of genus and species is one which will repay further consideration; but before entering on such, it will be well to take notice of two counter-movements of thought which characterize the whole conceptive process, and the recognition of which is needful at nearly every stage of logical inquiry. Which is larger, the genus or the species? Which is part, which whole? The answer is, that either is larger than the other;

[1] I have already said that the effort and operation of conception is to answer the question, What the perceived or described object is? Science endeavours to do the same more fully, and with more essential truth; in both cases the aim is to determine species.—Bacon, Nov. Org., lib. II. i.

either is part of the other as its whole, according as we think in the direction of extension or that of comprehension. The genus is larger than the species in respect of extension; it contains more objects under it: the species as contained under it is one of its parts. On the other hand, the species is larger than the genus in respect of comprehension; it comprehends more properties: the genus is in this regard one of its parts. Let us illustrate this from Natural History. Felis catus, the common cat, is contained under the genus Felis, which is more extensive than itself, containing as well the lion, the tiger, the panther, &c. The genus Felis, again, is contained under the wider genus of Digitigrades, which is more extensive than itself, containing as well the dog, the wolf, the jackal, &c. Digitigrade is therefore a whole of extension, of which Canis, Felis, and the several species contained under them, in our present example the common cat, are parts. But if we think of the properties comprehended by the extensive genus Digitigrade, it is plain that we must exclude all that are peculiar to Canis, all that are peculiar to Felis, &c. On the other hand, going into narrower extension as far as Felis, it is clear that we have enlarged our comprehension, for Felis has, as its properties, whatever is involved in the more general notion Digitigrade, and whatever is involved in the more especial notion Felis. Contracting our extension yet further, and getting down to the common cat, we have proportionably increased our comprehension, for the notion of common cat comprehends all that is in the most general notion Digitigrade; all that is in the less general, but more especial notion, Felis; all that is in the least general, but most especial notion, common cat.

It is plain that the longer the range, the more we shall find this counter-law of less and more: the wider the extension, the less the comprehension; the more ample the comprehension, the less the extension. Animal extends farther than Digitigrade, seeing that it contains under it Plantagrades,—birds, fish, insects, &c. It comprehends, of course, no properties but such as are common to Man with the lowest Mollusca. Organization still wider in extension is still poorer in comprehension, seeing that while it extends to the whole vegetable world, it comprehends nothing but what is common to Man with Lichen or Fungus. The absolute summum genus existence obviously extends farthest, and cannot be said to comprehend at all; the individual cannot be said to extend, but comprehends most. The *maximum* of extension is the *minimum* of comprehension; the *maximum* of comprehension is the *minimum* of extension.

The term Comprehension being ambiguous, it has been proposed to substitute for it that of Intension. Better still, notions have been characterized according to their breadth and depth, the individual being at the *maximum* of depth, the summum genus at the *maximum* of breadth.

It is plain that a genus *qua* genus is a whole of extension or breadth, of which the species contained under it are the parts; and that a species *qua* species is a whole of comprehension, intension, or depth, of which the genera from out of which it is specified are the parts.

§ 3.

Species being the great aim and result of conception and likewise of science, we now betake ourselves to its more particular consideration. It is distinguished among Concepts by being alone susceptible of Definition, as will be apparent by and by. We cannot, however, approach the subject of Definition till we have given our attention to a process previously requisite, that of Division.

§ 4. DIVISION.

Division in Logic means the breaking up of a genus into the species which are its parts. Thus I divide the genus Felis into lion, tiger, panther, leopard, ounce, jaguar, puma, ocelot, margay, lynx, caracal, serval, wild cat, common cat; and my division is good, if these be distinct species, and if they be all the species that are contained under the genus; all that is on one plane of comprehension.

Humble as this process may appear at the first glance, it wore a different aspect to Plato, who said that if he could find a man perfectly master of Division and Definition, he would follow him like a god. This will not appear so extravagant if care be taken to distinguish Logical Division from mere enumeration, as in the taking of an inventory, or mere arbitrary partition. In the taking of an inventory, the things enumerated constitute no intellectual whole; they are simply all the things in the house, of which they are in no way constituents. They are not the elements of the concept, the house.

I neither am obliged to call in the aid of that concept to conceive or define them, nor does the concept demand them for its possibility. Neither does it much matter how the enumeration is done, so as it be but complete. The same thing being repeated, or one of the items being implied in another, will have little disadvantage beyond a waste of paper and ink. Mere partition is equally distinct from Logical Division. If altogether arbitrary, it is, of course, scarcely an intellectual process. The philosopher, says Plato, must divide by the joints, not hack any where like a clumsy cook. Logical Division is not performed except by a true analysis of the genus. It is vitiated by every thing which falls short of, or which confuses, such analysis. The following three rules must be complied with in order to ensure valid Division :—

I. The Division must be adequate; i. e. the parts must be equal to the divided whole, neither less nor more.

II. It must be distinct. The parts must each be separate one from the other. If one can be shown to include the other, then we charge the process with being in logical phrase a "cross" division.

III. The parts must stand in the same order of generality. Of course, with nearly any genus there must be a possible range of subalterns, any of which may be viewed as species of the said genus. But if in dividing we take some parts from one step of that range, and some from another, we have no security of getting either an adequate or distinct Division. It can scarcely in such case be adequate, for the lower species, which on this supposition form some of its parts, cannot cover the whole extension of their more immediate genera; neither are we sure of its distinct-

ness, for the parts that are higher species or genera may, for aught we know, contain species similar, as regards the point selected, to the lower remaining parts. The best Division is that in which we select the *proximate* parts, i.e. in which we divide a genus into species in the next lower degree of generality[2].

I violate Rule I. if I divide Mental Science into Ethics, Logic, and Psychology, because such a division gives no place to much metaphysical inquiry that does not come under any of these heads. It is, therefore, inadequate. The Linnæan system of Botany, in addition to many other defects, is charged with inadequacy, inasmuch as it omits the Palms[3].

I violate Rule II. if I divide Mental Science into Ethics, Logic, Psychology, Ontology, and Metaphysics, because Metaphysics includes one or two, if not all, of the other members. Such a division is, therefore, a cross one. The ten categories, as we shall see when we come to them, are liable to this charge. This is one of the commonest faults into which men fall in discussion. At its best it is an awkwardness, confusing the method and obstructing the clear presentation of thought.

I violate Rule III. if I divide the Digitigrade animals into sheep, goats, oxen, horses, the cat kind, foxes, wolves, and dogs. Here the parts are not in the same order of generality, foxes and wolves being species of the genus Canis (the dog kind), just as lions, tigers, &c., are species of the genus Felis (the cat kind). Had I, therefore, given the genus Canis, and thereby kept in

[2] The next, of course, conceived by us. We cannot affirm of any degree that it is absolutely the next.

[3] Linnæus was obliged to make a class for them outside his general system under the name of *Appendix*.

the same order of generality as the other members of my division, I should have been secure against omitting the jackal, which would have been included as being contained under that genus.

All genus as such is capable of being divided; so is all species which, containing other species under it, can be viewed as genus. The infima species is rarely divisible, if for no other reason, yet for this, that we rarely know the number of individuals contained under it. The unit or individual is, of course, incapable of Division, as the latter of the two names imports. It can be but parted, in which case the severed parts are fractions, things broken.

As we divide our concepts, and not the matter or the objects which give rise to them, it is plain that the same thing is susceptible of many divisions, all valid in themselves; but most of them, however useful, each in its turn, impertinent for the one given purpose before us. Again, a genus, one and the same in name, may contain under it various sets of species having little or no relation to each other, the propriety of dividing into one set of which rather than another, will depend on the set of concepts being or not being germane to the matter before us; i.e. being or not being the contained parts of the generic Concept that is actually present to our thoughts. For though the name and the matter may be the same, yet the generic concept may be very different. Man is generically a different concept according as we are thinking theologically, ethnologically, or with a view to the inquiries of Natural History or Comparative Anatomy. And, therefore, Man will be variously, but with reference to the existing purpose, equally well divided. Thus the ethnologist divides him into the Caucasian, the Ethiopian, &c. For St. Paul's

purpose, in the Epistle to the Romans, it was enough to divide him into Jew and Gentile. I remember when a celebrated actress first appeared, an enthusiastic admirer divided mankind into those who had seen her and those who had not. St. Augustine has a singular division of Christians into four classes—those who have been baptized by good men, and are themselves good; those who have been baptized by good men, and are themselves bad; those who have been baptized by bad men, and are themselves bad; and those who have been baptized by bad men, and are themselves good. Unnatural as such a division seems and for most purposes is, it has a bearing on his argument in the place where he makes it, his aim being to separate baptism at once from the character of the administrator and the subsequent proceedings of the recipient.

Before quitting this subject of Division, it is right to take notice of *Dichotomy*, which is, indeed, the Division which comes rightly before Definition. As Division considered generally is the analysis of a Genus into its contained species, it would seem that we must know those species before we can make the Division, and we can only know them by definition. From this we should be apt to infer that the subject of Definition should be treated before that of Division. But, on the other hand, no single species can be determined without an act of Division—the act I propose now to consider, called in Logic, Dichotomy. In strict order, therefore, we ought to take Dichotomy first, then Definition, and then Division in general. To do so might, however, introduce more complexity into the mind of the beginner than would be desirable. Since some division must precede any Definition, I have

thought it best to take the whole subject of Division first.

The name and the subject of Dichotomy are associated by Logicians with the memory of Peter Ramus, an eminent philosopher of the sixteenth century, and one of the earliest rebels against the supremacy of Aristotle. He introduced a new method of inquiry, which soon gained a considerable amount of attention and favour, and Dichotomy was a leading feature in his own and in his followers' practice. Not that it was a novelty, having been employed ages before by Plato. It was, however, a leading feature in the system of Ramus.

The term, as its etymology shows, means a division into two, and such division was habitually adopted by the Ramists as the best. Always, according to their precepts, begin by dividing into two, and then subdivide, still in a twofold way, till you have completed your analysis. Thus, they would not have said, "Now abideth faith, hope, charity;" but "Now abideth charity, which is the greatest, and two others which are subordinate, faith and hope." They would not divide matter into animal, vegetable, and mineral, but into organic and inorganic; and would then subdivide organic matter into animal and vegetable. They would not, with Jussieu, divide the vegetable creation into monocotyledonous, dicotyledonous, and acotyledonous plants, but into cotyledonous and acotyledonous; and would then subdivide the cotyledonous into mono- and di-cotyledonous.

Ramus and his Dichotomies obtained, as I have said, a considerable share of attention and favour in their day. His new method is noticed both by Hooker and Bacon, and both speak slightingly of it, the former

generally, the latter alluding to its incessant Dichotomies. The charge of its leading to a fallacious nimbleness of discussion and a deceptive clearness is credible enough. Kant, however, treats Dichotomy much more respectfully, and pronounces it the only scientific division being always possible *à priori;* whereas all Polytomy is of necessity empirical, and requires previous knowledge of the objects in question. Plato, too, as I have mentioned, was partial to Dichotomy. A few words on this matter will not, I think, be misplaced.

Whatever the value of Dichotomy as a prescribed method may be, it cannot be overlooked by the Logician, seeing that it is one of the necessary laws of Thought. Species cannot be determined without it. In the very act of determining each species, I perform a Dichotomy between it and all the rest of the Genus. As this is quite necessary, it is, as I have said, the duty of the Logician to note it; but that done, the question remains, whether there is any good reason for prescribing a general practice of Dichotomy over and above that which, being unavoidable, will always be performed, with or without precept, on the natural occasion.

I cannot help thinking that there has been overlooked on this question the fact that there are two distinct purposes for which we practise Division. We divide in order to know, and we divide in order to register our knowledge, and to present it to others. While the contained species of a Genus are unascertained, we divide with a view to their ascertainment; and, as I have said, we must divide in order to separate each species by Dichotomy, whether we like it or not. When we have determined all the discovered species of a Genus, we then exhibit them in Polytomy.

Now it is worth considering whether, in all cases of uncertainty or confusion, there be not some advantage in beginning our task of clearance by Dichotomy. It has the merit, insisted on by Kant, of being always *à priori* possible. Whenever I have a notion, I can at once divide that notion from its negative; that is, from every thing besides. It has been laid down by Logicians, that any term and its negative denote the Universe. And by dichotomizing in a case of perplexity I gain this advantage, that I at once get rid of a mass of alien matter, to which I need not revert.

Further, it may be a question whether Nature herself does not in her more extensive genera adapt herself to Dichotomy rather than Polytomy; whether, when we are in the broadest regions of Generality, there be not always a greater chasm between one of three or more divided members, than between the others. If the case be so, then the principles of good Division dictate Dichotomy. Now, I think, there is a greater chasm between organic and inorganic, than between animal and vegetable matter—a greater chasm between cotyledonous and acotyledonous, than between mono- and di-cotyledonous plants. And though, in such cases, much cannot depend on our adoption of either the twofold or the ordinary division, a preference must always be due to that which is most in proportion to the actual state of the case. Though no very important result may depend on our mental procedure in a given instance, there is a difference in the long run between the operations of the mind that habitually prefers, and those of the mind that habitually neglects, the most scientific methods.

When, therefore, we have to discover and ascertain, I am inclined to think there may be some ground of

preference for Dichotomy. It is a measure ready to our hands, whereby we may take the first step in clearing away confusion. It is analogous to our procedure in material cases. In counting up money, for example, after a charity sermon, we almost instinctively practise a succession of material Dichotomies. We first separate the paper, the cheques and bank-notes, from the rest, then the gold from the silver and copper, then the large silver, the crowns, and half-crowns, from the small, and then the rest of the silver from the copper. And further, as I have said, in very extensive generality Nature seems to adapt herself to Dichotomy. In this case it is not only the best instrument of knowledge, but the best exhibition of our knowledge after it has been gained.

But when we descend in generality, though of course Dichotomy must still be our mode of determining each successive species, I can see no further advantage in it, if so be that we have found more than two species in the same order of generality. When I wish to divide the Digitigrades, I cannot perceive any advantage that I should gain by placing the cat kind on one side of the Division, and all Digitigrades not cats on the other. Rather, the order of Generality in the case of Felis, Canis, &c., being supposed the same, do I more adequately represent my knowledge by a polytomy, which recognizes it as the same. And, of course, when we come to the last genus, containing only infimæ species, those species are necessarily in the same order of Generality, and Polytomy becomes the rational Division.

Since there are two counter-wholes in Conception, that of Extension and that of Comprehension, it may be asked, why Division should be confined to one of them,

and the rather that both are now recognized as logical wholes? To which it can be answered at once, that the whole of Comprehension may be divided just as well as the whole of Extension. An infima species is divided when we give all the genera, which, viewing it as a whole of Comprehension, inhere in it as its parts. Thus I divide the whole of Comprehension Felis Catus, when I give as the parts, Felis, Digitigrades, Mammal, Animal, Organization. But the next section will show that such a process would be of little practical use. Long before I have come to the infima species, the higher genera must have been clearly known by me; and the remaining want in its analysis is supplied by Definition, in which, indeed, the kind of Division just suggested may often, if not always, be considered as implied. Definition is, therefore, the counter-process to Division, the analysis of the whole of Comprehension, as that is of the whole of Extension. To Definition, therefore, we must now betake ourselves.

§ 5. DEFINITION.

Definition is the analysis of a whole of Comprehension, as Division is that of a whole of Extension. In some Logical Treatises mention is made of more than one kind, as Nominal and Real Definition, and the latter has been divided into Accidental and Essential. These distinctions, however, are of no logical validity. The science as such can recognize but one form of Definition, and surrenders the others to the lexicographer and the describer. The kind of Definition now before us must be kept quite distinct in thought

from all mere explanation of the meaning of words, whether by means of other words in the same or a different language. What we are now concerned with is the Definition of a Concept; and this is not effected unless we have attained the result suggested by the primary meaning of the word Definition. We must bound the whole concept. Our Definition must supply us with its entire outline, so that every thing essential to the concept may be included, and room found within it for each accession to our knowledge concerning it. I now proceed to consider how this is to be done.

I have said that Definition is the analysis of a whole of Comprehension. Now, unless it be an individual, a whole of Comprehension as such is always a species. Hence, only species among our concepts admits of Definition, the individual being undefinable for a reason that will straightway appear.

Now, what is species? It is, as its very name denotes, the aspect or form under which we conceive an object, when we have attained a determinate notion of it—a notion that combines Extension and Comprehension, breadth and depth.

Now, in such a notion it is, of course, referred to its genus, and in that genus to one of its conceived classes. The genus, of course, contains other species than that with which we are occupied. Between our present species and those others there must be some common characteristics, otherwise they would not belong to the same genus; but there must also be something in our species not common to it with the rest, otherwise it would not be a separate species in that genus. Now, that which is really distinctive of a species, separating it from the other species of the same genus, is called its

Differentia. The Differentia of the species Man in the genus Animal is, that he is rational. The Differentia of the species Planet in the genus Heavenly Body is, that it goes round the sun. Now, I define a species when I give both its Genus and its Differentia. I thereby circumscribe my concept; I trace its full outline.

For example, to say of Bird that it is a biped, is not to define it. Doing so does indeed refer it to a genus, Biped, but does not separate it from other species of that genus, such as Man. (I am using the term biped in its ordinary, not in the naturalist's or anatomist's acceptation.) But if I say that bird is a feathered, beaked, oviparous biped, I have defined it according to the average, if not the naturalist's conception, for I have assigned it to its genus biped, and I have stated its differentia in that genus—feathered, beaked, oviparous.

It will now be plain why only species is definable. The individual can, no doubt, be referred to a genus, but it presents us with no adequate Differentia. I can mark it off, no doubt, at one given place, as when I say of King John that he was the king (thus referring him to a genus) in whose reign Magna Charta was passed. But it is easy to see that this latter is not an adequate Differentia. When combined with the genus it does not enclose the whole concept, and is, therefore, not a Definition. It is essential to Definition that the whole concept should thus be enclosed, that it should be separated all round, so to speak, from every thing besides.

Again, the summum genus is incapable of Definition, not only for want of a Differentia, but of a genus above itself. We cannot define the Universe, or all

existence. And even in the case of lower genera, we can give no definition of them if they be summa genera in existing Universes of Thought. Thus, bird is the summum genus of the ornithologist, and as such admits of no definition within his science. To procure such, he must have recourse to zoology, and view bird as a species of animal. Similarly Animal has no definition within the limits of zoology, for there it is the summum genus; and to find such we must go to Natural History, and refer it to the genus Organization; and if we call it Sentient Organization, we shall perhaps have defined it rightly; we shall certainly have defined the ordinary concept Animal.

As it was laid down that the best Division is that in which we take the proximate species, those in the next lowest degree of generality to the genus which we wish to divide, so the best Definition is that in which we take the proximate genus—the genus in the next highest degree of generality to the species which we wish to define. As in the one case it is safest not to descend more than one step at a time, so in the other it is safest not to ascend more than one step at a time. If we neglect this, we cannot be secure of our Differentia answering its purpose, being a Differentia at all. It may be a property belonging to but one species in the proximate genus, and with that will give us our Definition; but it may also be a property belonging to some species of another genus contained in the higher one, to which we have had recourse, and therefore will stand us in no stead. Thus, we took rational as a Differentia for man, and animal for his genus, understanding the latter term in the ordinary way as denoting the sentient beings of this planet; and thereby we gained a Definition. But had we,

retaining our Differentia, mounted higher in generality, and called man a rational creature, we should not have defined him, for the angels are rational, and therefore our Differentia would not have been really such. Instead, therefore, of trying to define man as a rational creature, we must have recourse to a lower genus, one which we may consider as proximate to himself. If we take Animal, understanding by the term, as we naturally do, the terrestrial sentient, and combine it with the Differentia rational, we shall have gained a Definition. Man is rightly defined as a rational animal. I do not mean that such a Definition will be sufficient for every purpose. The Concept Man varies in different sciences, and different ways of regarding him. Of course, Animal would not be his proximate genus in the eyes of the naturalist. For his purposes he must go much lower down, and this without reference to the absurd and unreal genus for Mankind, which zoologists, from defect of logical principle, have coined[4].

As Definition corresponds to Division in other things, so, of course, it does in this, that it varies with varying concepts. Man is one concept in the eyes of the naturalist, and another in those of the theologian or the moral philosopher. As he will be differently divided by those different students, so will he be differently defined. And hence we can only define Concepts, not the matter on which they fasten. As no one of those concepts embraces all our knowledge of such matter, and comprehends all our notions of it,

[4] They used, I believe, to speak of the genus Homo with but one species in it—rationalis. This is absurd in a logical point of view. Only one species is equivalent to no species, or rather a genus with only one species is no genus.

it is impossible to give what is termed an exhaustive definition of any thing.

Still, in the absence of such, we must not fancy that we are free to choose our own concept of the thing to be defined. Just as much as in Division, we must take that which is germane to the question before us, and which is common to both parties, if there be more than one, to the inquiry: otherwise we may fall into the common error of explaining to another either what he knew already, or what he did not want to know. Every one, I suppose, who has had occasion to consult authorities for information has suffered under this.

Another rule to be observed does not surely require many words. The Genera and Differentiæ must be known to the reader or hearer, otherwise we are liable to the charge of explaining the *ignotum per ignotius*. Dr. Johnson's celebrated definition of network is a signal instance of this. All who may have wished for a definition of it must have opened the dictionary with some previous notion of *network;* thousands may have closed it with scarcely any of *reticulated* and *interstices*.

It may now be apparent that Definition, or that determination of species of which Definition is the statement and analysis, fulfils the demand and satisfies the effort of Conception; it answers the question, What the perceived object is? It presents a determinate notion, one which is solid, in which Extension and Comprehension, breadth and depth, are combined in the requisite proportion. We might always have more breadth by surrendering our species for the sake of a higher generality; but then we should lose in depth. We might have more depth by going to the individual, but we should thereby sacrifice breadth.

The determination of species is, therefore, a synonym for distinct knowledge; and as such determination is the great aim of Conception in general, so is it still more markedly of most, if not of all science[5]; certainly of those branches called the classificatory, most of which are included in the general name of Natural History[6]. In fact, the naturalist's procedure consists of a continual Division and Definition. He divides his class into orders, which orders are defined by combining with their class the names given to them. These again he divides into that grade of subalterns which alone he calls genera, and which likewise ought to be defined by combining with their order the names given to them; and finally, he divides such genera into their species, and the generic and specific names of each of these latter ought to be its Definition. Unhappily, naturalists do not sufficiently attend to this, and so far they impair the scientific character and value of their pursuit. An evil fashion has prevailed among them, which I know was greatly reprobated by the late Sir James Edward Smith, of paying compliments by naming genera and species after each other. Of course, such names in no way subserve the ends of science, embody no determination of our

[5] According to Bacon, of all: "Datæ—naturæ formam, sive differentiam veram, sive naturam naturantem, sive fontem emanationis—invenire, opus et intentio est humanæ scientiæ." He does not, however, mean the form, true difference, &c., of any concept of the thing, but that one which is essential to it, our power of discovering which he believes in.

[6] Natural History would, I suppose, be generally divided into zoology, including ornithology, ichthyology, entomology, conchology, and botany and mineralogy. But there are other classificatory sciences which we do not habitually speak of as branches of Natural History, such as nosology.

notions of the object before us. Their uncouthness, more especially when the complimented parties are Germans, whose names have to be decorated with Latin terminations, is but a slight objection comparatively. But waiving the outrage on my ear, what am I the better for hearing a rare moss called Hedwigia Hornschuchiana, beyond being led to infer that Germany has, or had, two botanists, one called Hedwig and the other Hornschuch? On the other hand, when I am told that such a moss is called Trichostomum lanuginosum, I am, on supposition of previous knowledge of Trichostomum, presented with a Definition, lanuginosum expressing the Differentia of this species in the genus Trichostomum, even as Trichostomum does that of the genus when viewed as species of the higher genus which contains it.

This bad habit of complimenting has prevailed especially among botanists, and is the more to be regretted in that botanical language presents us with a singularly flexible, beautiful, and expressive terminology. The botanist's description of a species is as felicitous as his name for it is too often meaningless. It is Mr. Mill's remark, if I remember rightly, that the science would gain greatly were its nomenclature as good as its terminology. It may, indeed, be alleged in reply, that no practical evil ensues; the generic and specific name always so indicating the plant as to enable the naturalist to discriminate and recognize it. But I have already put in my protest in favour of the scientific habit of thought and method of procedure, even though no very practical result follows from them in given cases; and I cannot but feel that botany would gain in dignity, and would supply richer food than it does at present to the mind, were its nomenclature made a better representative of

our knowledge of plants; were that knowledge more fixed and embodied therein; were the names more in harmony with that first-recorded operation of the human intellect, when "whatsoever Adam called every living creature, that was the name thereof. And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field."

Nor is this unscientific nomenclature the only fault of which botanists and other naturalists are guilty. For want of logical appreciation they sometimes tend to consider genus as merely conventional, as something merely convenient and subserving the same sort of end as a surname amongst men. Hence, thinking it requisite that each species should have two names, they present us at times with the logical absurdity of a genus containing but one species. Homo has been made a genus of this kind; so, too, the hippopotamus and other animals. Two cases shall be selected for consideration, as in their way exercises in nomenclature—one from zoology, and the other from botany. The duck-billed platypus, of Australia, is one of the most remarkable and anomalous of zoological phenomena, and, as such, of course one of the most difficult to class under any previous system. He received at one time the name Ornithorynchus Paradoxus. Thus, there was a supposed genus Ornithorynchus containing but one species, Paradoxus; i. e. the distinction between genus and species has here no place. Supposing other species of Ornithorynchus to be discovered, we should, if we retained the name paradoxus for our present acquaintance, have to find other specific names for them. But what would be the propriety in that case of the name paradoxus for this one? He is paradoxus because he is ornithorynchous, and they will, by hypo-

thesis, be equally ornithorynchous with himself. It would be more logical, I think, to reverse the names—to have a genus *paradoxus*, containing anomalous animals, such as the flying fish, the opossum, and the ornithorynchus, and to make ornithorynchus the specific name. The animal is paradoxical, and the specialty of his paradoxicality consists in its being ornithorynchous. Of course, this would be a preposterous zoological classification, but it would be more logical than that now in question. I believe the name now current is Platypus anatinus—the duck-like, broad-footed. This has much more meaning than the other, and, had we other species of Platypus, would do very well. The objection, however, still remains—Why represent both a genus and a species where there are not both[7]? Why thus turn the generic and specific ideas, in themselves so valuable, so much at the foundation of all method, into mere conventionalities? Why not make your nomenclature, as far as it can be, the pure representation of your present knowledge? Why not say there is a species called Platypus, which we have not yet found to be contained in any genus on the same grade of extension as the allied genera of Bradypus, Dasypus, Rhinoceros, &c., and which as yet we must simply refer to the higher genus, in the language of Natural History, the *Order*, Bruta?

The next case shall be botanical. Among the mosses there is a very anomalous kind called Buxbaumia aphylla. The name Buxbaumia indicates, I suppose, the present or past existence of some German called Buchsbaum. The other, aphylla, denotes the specialty of the plant—its leaflessness. The pretended genus

[7] I believe that another species has been discovered.

Buxbaumia contains as yet but the one species aphylla, i.e. is not a genus at all[8]. As a name, it tells us nothing whatever. Would it not be better to say, that amongst a particular division of mosses there was a leafless species, aphyllon, which could not be referred to any intermediate genus? This would not only make the nomenclature representative of existing knowledge, but it would keep the name aphyllon in a capacity of becoming generic, should other leafless mosses be discovered, the same with this in respect of peristome, but presenting distinct specific character. On supposition of this, aphyllon would become the suitable generic name.

§ 6. THE PREDICABLES.

We have seen that it is possible to have many concepts of the same matter. Some of these have so little to do with each other as to be scarcely ever conjointly thought of. Nay, it is possible for some of them to be familiar to minds utterly unacquainted with others. The working man distinctly conceives a spade, and the butler a corkscrew, without either having heard of the generic mechanical powers of the wedge and the screw, to which the professor of mechanics instinctively refers them. A sugar-loaf may be conceived, and many of its sections too, without any acquaintance whatever with ellipses, parabolæ, or hyperbolæ. On the other hand, there are concepts, not to be referred at once to the head of either genus or species, but which are yet so bound up with these as almost necessarily to accompany them when they are presented to the mind. Thus, when I think of a

[8] This too, I rather think, is no longer the case.

cat, I not only, by dint of its manifest genus and differentia, view it as a specimen of Felis catus, but points not directly referrible to either genus or differentia, such as the extreme softness of, and electrical feeling produced by the fur, the raised tail, the habitual purr when the animal is comfortable, almost necessarily accompany my view of it. Now, when we add all the possible concepts of the same matter, which are quite separable from those which have determined the species, to all those which almost necessarily accompany it, the number is found in nearly every possible case to be prodigious. The inspection of Logic, like that of the telescope or microscope, astonishes by the number of objects it brings to light. Yet vastly numerous as are the concepts that may be fastened on, or connected with the same matter, they are reducible to but five heads, which are called the five Predicables.

In considering these we may dismiss the consideration of a plurality of concepts so independent of each other, that the mind which is entertaining one or one set of them may be quite uncognizant of the rest. When this is the case, as for example in the case of a sugar-loaf, in regard to which one person may be thinking of the kind and quantity of sugar, and another of the geometrical form and properties of the lump, we may simply speak of different spheres of conception, each separately reducible to the laws of Division and Definition, and giving us the results of genus and species as we have already considered them. But there seems a little more to consider in cases where the concepts accompany each other, such as in the instance I have already given of the domestic cat, where, in addition to the generic and

specific characters, we cannot help thinking of many attributes or qualities besides. All these, however, as has already been said, are reducible to five heads—the Predicables.

These are, as generally laid down, the Genus, the Differentia, the Species, the Property, the Accident. Genus and Species, have already been considered. It remains that we gain some view of the rest. So far as we have yet gone, we have considered all our concepts as either generic or specific, the individual itself being only conceived by having his species determined. But in order to determine species we were obliged to recognize a concept, the Differentia, of the nature of which nothing has as yet been said. And the reader may be ready to ask, Is this concept a new kind, neither genus nor species? And so of the remaining two—the Property and the Accident.

I must first state what is meant by each before answering this question.

The Differentia, as we have already seen, is that which distinguishes a contained species from the rest of the genus which contains it, and gives us in connexion with that its Definition; e. g. It is the differentia of man on earth to be rational.

The Property is an attribute belonging to the subject, but not part of its specific character, not therefore distinctive of it, not part of the essence, but yet always accompanying it; e. g. It is the property of man to be risible.

The Accident is an attribute which does not belong to the whole essence of the subject; i.e. it may belong to an individual, but not to the species; or to the species, but not to the genus. The Accident is divided into the separable and the inseparable,—as

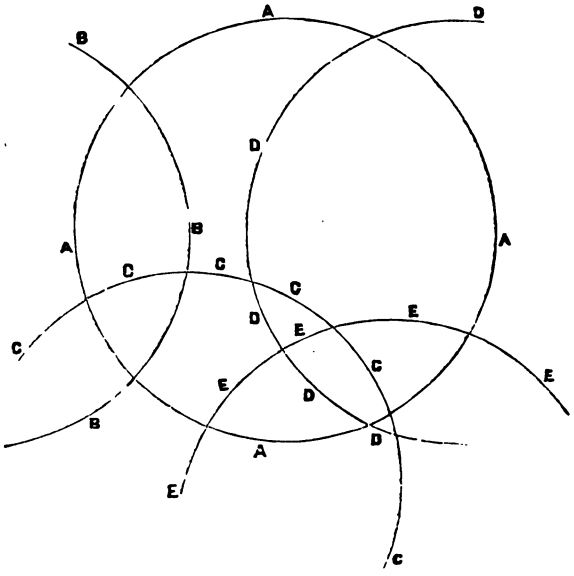
when we say, "The man is an Englishman," thereby denoting the latter; "The man is drunk," thereby denoting the former.

Under one or other of these five heads must every term be ranged, and, consequently, under one or other of them must every thing be predicated, i.e. affirmed or denied, of another. Hence their name of Predicables.

Now the first and the only logical question to be considered about them is, whether the three, Differentia, Property, and Accident, are in any way really distinct from the other two, Genus and Species. With a view to answering this, let us take the three in their order.

1. Differentia. Differentia is not one of Aristotle's Predicables. He dispenses with the consideration of it, ὡς οὖσαν γενικὴν, as being of the nature of Genus. And so when the matter is thought out it will be found to be. Affirming the Differentia of any part of a Genus, is but referring that part to some Genus. I view man as a contained part of the Genus animal. When I distinguish him in that Genus by his Differentia rational, I hereby refer him to the Genus Rational. And thus we get at, perhaps, the simplest and ultimate notion of Definition and Species, when we explain them into the coincidence at a given place, the overlapping at such given place, of two genera, neither of which is co-extensive with the other.

When, therefore, a notion is merely referred to one Genus, it remains undetermined; it is in the region of mere generality; we have gained nothing but breadth. But when just at that notion, and commensurately with it, another Genus comes into the concept, then that concept becomes determinate, is solid, has depth as well as breadth, is defined, is species.



Genus A partly overlapped by Genera B, C, D, and E, giving for species AB, ABC, AC, ACD, AD, ADE, AE, ACDE.

And so Differentia turns out to be but Genus—a Genus overlapping, but not commensurate with, another Genus. And this may serve to explain what is apt soon to strike any one who is thinking of Definition and Species: that the Genus and Differentia in any Definition may perfectly well change places; that what we regard as the Genus may be regarded as the Differentia, and *vice versâ*. Thus, in Abp. Thomson's illustration of Definition as consisting in the over-

lapping of two not co-extensive genera, we may now view, as we ordinarily should, currant as the genus, and red-flowering as the differentia of the species—red-flowering currant; and we may also view red-flowering as the genus, and currant as the species. I do not say that it would be equally rational to do either, but it would be equally in conformity with the law of Thought[9].

Let us now turn to Proprium, or Property. This is an attribute inseparably joined to the concept, but not part of its essence That essence resides in species, of which Genus and Differentia only are the parts. Thus, risibility is a property of Man, but it does not enter into his definition. I cannot here consider the question whether a higher knowledge would not throw the properties of a species into its Definition, i. e. into the essence of our concept of such species. One cannot but feel assured that it would; but I must not pause on this subject at present. I must go on to say that Property is manifestly genus, but not taken as genus when some other attribute is.

Accident differs from Property in not being co-extensive with the species to which an individual belongs in whom, or with the genus to which a species belongs in which, we find it. It is an accident that a Professor of Mathematics is a clergyman, and that some cats are black. Accident is divided into *separable* and *inseparable*. The clerical character of certain Professors belongs to the latter; the fact that they are lecturing at a given time, to the former: the blackness of some cats to the latter; that the cat is purring just now, to the former head. Now this,

[9] "Outline of the Laws of Thought." Edit. 4th, p. 142.

too, is plainly generic in its nature. If I say the Professor is a clergyman, or that the cat is black, I refer them to certain kinds—clergyman and black. If predicating a separable accident of either, I say that the Professor is lecturing, or that the cat is purring just now, I equally refer them to certain kinds for the time. Though he does not belong to it at all times, the Professor belongs at the moment to the genus of men lecturing; though not always, yet for the moment the cat belongs to the genus of animals purring[1].

Thus, the law of Conception, with which we started, turns out to be the only one, and in all acts of Conception, whether the notion be that of the genus, the difference, the species, the property, or the accident, we are referring the perceived object to a kind. It is now natural to inquire why, this being the case, we make any distinction between the Predicables further than those which are necessary between Genus, Differentia, and Species. Those, indeed, we have seen to be necessary, for the aim and the energy of Conception do not stop till they have arrived at Species, and that can only be done through Genus and Differentia. But why not recognize the three, Differentia, Property, and Accident, simply as Genera, the first of which by partial coincidence with a given Genus produces at that part a Species, and the remaining two might each be considered the genus or the species, according to what might happen to be the sphere of Conception at the moment? Undoubtedly they might; but, nevertheless, they require separate consideration, inasmuch as

[1] Of course no one aiming at a rational classification would range any thing under a separable accident.

when we have started in one sphere of Conception, and are consequently already provided with a genus and arrive at a species, the concept of these is accompanied by the concept of property and accident. Neither their essentially generic or specific character, nor their capacity of being regarded on occasion as genera or species, is denied; but when a genus or species is already given, and yet they are present, it is manifest that they require to be in some way distinguished from such genus or species. It is in such case that they are regarded as Property or Accident.

An ordinary perception then of any single object gives birth to the five notions—its Genus, its Differentia, its Species, its Property or Properties, its Accident or Accidents.

Each perception would seem capable of awakening all this Conception. And the statement of it all will therefore run through the five Predicables or Universals. Thus, in books of Natural History we have stated the genus and the species in the two names of the latter, which, taken together, ought to give us the Definition, and there is then a further description which supplies the remaining Predicables.

Now, here it is natural to ask that question which may be pronounced the greatest problem in Philosophy, which has arrayed thinker against thinker, which has disturbed not merely the repose of the schools, but the politics of Europe, and which lies, I am persuaded, at the root of our leading differences in Theology at the present moment. We have seen that the five Predicables are all essentially generic or specific, i.e. are all Universals; and that we distinguish Property and Accident from genus and species only when they are connected with a genus and species already given.

It follows that they might themselves be taken as genus or as species. Thus, we should naturally speak of risibility as a property of man. But we might, if we chose, consider man as belonging to the genus of things risible. And we have already seen that in Definition the Genus and Differentia might perfectly well change places, the Genus being regarded as the Differentia, and *vice versâ.* Are Genus and Species then matters of purely arbitrary arrangement? Do we think equally well, equally in accordance with the Truth of things, whatever disposition of the Predicables we choose to make in regard to the objects before us? Is there nothing which more than other properties constitutes the thing? Is there no essential Species, no combination of attributes which more than any thing else is the species, and to which, therefore, the other attributes belonging to the same sphere of Conception stand in the relation of the other Predicables? It is admitted, that species is the essence of the Concept[2], but can I conceive a species which may be pronounced the essence of the thing? This brings us to the great question to which I have just referred,—that between Nominalist and Realist. In itself it is extra-logical, for Logic proper has to do, not with the matter but the form of Thought, and the requirements of the science are complied with, on whatever attributes or arrangement of attributes we choose to build our fabric of Universals. But as the space which this question has occupied in men's thoughts is

[2] Given a Concept. "Species expresses the whole essence, while Genus indicates the common, Differentia the distinguishing part of the same essence, and Property something joined necessarily, Accident something joined contingently, to it."—*Chretien on Logical Method,* p. 151.

so great, as its intrinsic importance is so vast, and as it is so difficult to entertain the subject which we have been considering without approaching it, I think it well to submit a few reflections upon it, which, to avoid mixtures of science, I have placed in the Appendix.

This question, too, lies at the root of the Baconian Philosophy. His aim, as we have seen in a passage already cited, is to arrive at the Differentia vera, the Natura naturans, the Fons emanationis of a given Nature. He must, therefore, be considered as believing in the possibility of exhaustive definitions of species which are such absolutely.

I must refer to the Appendix for my views of this question. It may suffice here to say that, whichever way we answer it, hardly any man will be found affirming that all the logical classifications of given matter which may be possible, would be, I do not say equally serviceable, but equally rational. And if not, we can hardly say that they would be equally true, if the aim of classification be to approximate to, if not to arrive at, Truth. More than convenience, surely, would be affected by a classification that should place together the fly and the elephant, as being both furnished with probosces; or the torpedo and the charged electric jar, as being both capable of giving an electric shock. Whether or not we can discover an absolute species, or arrive at an exhaustive definition, it must be the aim of science to keep continually approximating to these. By setting them before herself as an Ideal, she will at least make progress; and thus the constant pressing forwards to an absolute knowledge which may be unattainable, will prove the means of indefinitely and continually enlarging our stock of relative knowledge.

§ 7. THE CATEGORIES.

The word *κατηγορία* originally signified an accusation. Aristotle employed it in the sense of affirmative Predication, and as all such must be ranged under some one of the necessary conditions of things, he called these latter the Categories, and, on the same ground, the Latins termed them the Predicaments.

As given by Aristotle they are ten in number, and are as follows:—

1. Substance.
2. Quantity.
3. Quality.
4. Relation.
5. Action.
6. Passion.
7. Place.
8. Time.
9. Posture.
10. Habit.

Little consideration is required to see that the subject is, in the main, extra-logical. These distinctions are rather affections of things themselves than of our thoughts about things. If they are to be referred to the mind at all, they must be called conditions of Perception, not of Conception. In either view they belong to Metaphysics or Psychology, and are foreign to Logic. Nevertheless they may not be passed over here, inasmuch as they have, in fact, been for ages

associated in men's minds with Logic. This may have, in the first instance, been caused by the position of the Treatise on the Categories, generally ascribed to Aristotle, in that particular division of his works termed the Organon, in which it stands first. Those works treat mainly of logical questions. The term Category, too, connects itself with Aristotle's verb for the act of Predication. And there is, as we shall by and by see, one point of contact between these Categories and pure Logic.

Aristotle's division has long been objected to as a cross one. The fourth Category, Relation, obviously includes the remaining six, if, indeed, it do not include all but the first. In handling the subject, he runs sometimes into Metaphysics, and sometimes into mere Grammar. Indeed, his list of Categories corresponds very markedly with the parts of speech, the noun Substantive, in accordance with its name, giving expression to the Category of Substance, the Adjective to those of Quantity and Quality, the Verb to those of Action and Passion, the Adverb to those of Place, Time, and Habit, the Preposition to that of Relation.

The Categories have the effect of dividing the Predicables into two great classes. These latter, the Predicables, either belong to the Category of Substance or to some one of the remaining nine, all of which, as we have seen, may be considered relative. Genus and Species belong to the former; Differentia, Property, and Accident to the latter. Substances are considered by Aristotle as of two kinds—individuals, which alone have an independent existence as things, and which he calls *πρῶται οὐσίαι*, first substances; and species and genera, which he calls *δεύτεραι οὐσίαι*, second sub-

stances, and to which he would seem in the Categories to deny such independent existence. But of this more elsewhere. In whatever light we are to regard δεύτεραι οὐσίαι as regards the question of their existence, it is manifest that they occupy the same place in the sentence, and fulfil the same function in the judgment, as the πρῶται οὐσίαι, and therefore they belong to the same Category.

We need not pause, I think, on any of the Categories except the first, that of Substance, or as it is in the Greek, οὐσία. And here it is obvious to remark, that the Latin, Substantia, is by no means a translation of οὐσία. That would doubtless have been better rendered by Essentia, which more nearly corresponds to it. The result of this use of a word which is no equivalent for that of which it is the substitute, was considerable theological inconvenience. The Greeks, with some exceptions, were wont to speak of the persons of the Blessed Trinity as three Hypostaseis, and the denial of three Hypostaseis in the one Godhead seemed to them indicative of Sabellianism. Now, Substantia would be the exact translation of Hypostasis, but Substantia was used by the Latins as answering to the οὐσία of the Greeks, and, consequently, the far-famed Homoousion was rendered by Consubstantial. And thus, when the orthodox of both divisions of the Christian world came together, they found their respective statements in flat contradiction. It was some time before they arrived at the conclusion that those statements, mutually contradictory though they were, had the very same intention.

The Categories have another bearing on Theology. Much of the reasoning in St. Augustine's great work

on the Trinity,—the work which, perhaps, more than any other, has fixed the language of the Western Church on the subject, is based upon them. St. Augustine views every Scriptural statement regarding any one of the Sacred Persons as belonging to a Category of Relation, and every such statement regarding God and Godhead, irrespectively of the Persons of the Trinity, as belonging to the Category of Substance[3].

It remains before parting with this first part of Logic that we consider certain distinctions among terms, which materially affect our subsequent use of them.

§ 8. QUANTITY.

Terms vary in their logical quantity, inasmuch as they either express the whole or a part of a notion. These logical must not be confounded with material, or even with Mathematical, quantities. It is not the business of Logic to say what proportion the part bears to the whole (except, perhaps, in one case), or how many parts are denoted by the term. The distinctions of which it takes cognizance belonging not to the matter but the form of Thought, the only logical question in general is, whether the entire or not the entire notion be denoted. There are, however, according to some, partial exceptions to this, as we shall see presently.

[3] The distinction is, I am sure, untenable; but I cannot enter on the question here.

Terms are, for the most part, divided into,—

1. Universal, which denote the whole notion, as *all men*, *no men*, which terms are said in Logic to be *distributed;* i. e. to be applied to every part of the notion; and,

2. Particular, which denote but part, it is not said how much, of the notion, as *some men*, and which are said to be *undistributed.*

These names, Universal and Particular, may be changed with advantage into Definite and Indefinite, the Universal giving us a known whole, the Particular not. The word Indefinite is, however, applied quite differently by many Logicians.

Terms, too, may be Singular, i.e. they may denote the Individual or Unit. These are, for the most part, regarded as Universal, for they are necessarily distributed. I cannot affirm or deny any thing of John without meaning the whole of John, as is involved in the very signification of the word Atom or Individual. Notwithstanding this, as there are certain logical considerations which bear upon Singulars as such, they require to be discriminated from other Universal terms.

Terms may be Indesignate. Such are sometimes called indefinite, but infelicitously. By this class are marked off such terms as denote the whole class, and yet what is predicated of them is not necessarily understood to apply to every individual of the class, as when we say, "Men love mirth." Here man is indesignate. In making this assertion I do not intend, nor am I understood to affirm, that every man loves mirth; neither, on the other hand, am I speaking of a part only of the notion Men. I am affirming the love of mirth of the species Man. When, therefore, we use an indesignate, we are really employing a

universal term[4]. The former is as total in its grasp, and has exactly the same logical bearing on the sentence, as the latter. The difference is, that the indesignate leaves room for possible exceptions, the prefix "all" peremptorily excludes such. But in using the indesignate, there is no account taken of such exceptions. The indesignate, then, expresses a universal notion: the prefix "all" adds to the entireness of the notion the preclusion of any exception in whatever comes under that notion. The real difference between these two forms of the Universal term will, I apprehend, be found in the Predicables of which they may be the subjects. When those are Genus, Differentia, Species, or Property, then the peremptory *all* or *none* may be employed if wanted; but when the Predicable is an Accident, although the subject be a Universal, the term by which we denote it must be indesignate.

Care must be taken not to pronounce every term indesignate that has neither the marks of Universality —*all* or *none*, nor the mark of Particularity—*some*. In the case of the Predicate such a test would altogether mislead. I believe, however, that it is a safe one with the subject, in the English language at least. It may be worth while to glance at one or two cases that seem adverse to this last assertion.

Logicians in general regard the indesignate term as Universal or Particular, according as the Concept expressed is necessary and universal or contingent.

[4] I ought here to recognize the fact that in saying this I am opposing Aristotle, and I scarcely expect converts to my view, on so cursory a statement of it as that to which I am here limited.

Of the former class Morell gives us a specimen,—"Bees are wise insects,"—where we shall have no difficulty in regarding bees as universal: of the latter, "Cherries are ripe," where he considers cherries to be used particularly. I am constrained to differ. When I announce tolerably early in the season that "cherries are ripe," certainly no one will understand me to mean that there are no unripe cherries. Probably, both speaker and hearer are well aware that the cherries yet unripe are in a large majority. But still, it is of the kind, the species, the entire notion, cherry that I affirm ripeness. I do not say that every specimen has ripened; but I say, that the time has now arrived when the ripeness of the species may be announced. Cherries, the species, were not ripe three weeks ago, although some one may have found a ripe cherry or two. Cherries, the species, are ripe now, so that ripe cherries may be looked for and promised, although there may be abundance of unripe individuals. I submit, the term Cherries thus used cannot be regarded as other than Universal[5]. Again, "Men sometimes have a morbid pleasure in hurting themselves." It would be difficult to bring forward any thing more exceptional, any thing farther from universality than what is here affirmed. It belongs entirely to the Predicable Separable Accident. But I contend that

[5] As we have not yet arrived at the Syllogism, this is not the place for considering whether this regarding of all Indesignate Subjects as Universals is compatible with the fundamental rules of reasoning. I will therefore endeavour to show in the Appendix that what I have laid down in opposition to Mr. Morell regarding cherries, will not warrant our saying—

"Cherries are ripe.
These are cherries.
∴ These are ripe."

the subject Man is used universally. The proposition states that an occasional morbid pleasure in hurting themselves is a separable accident of men—of the species Man. Of course, the same fact can be stated otherwise, by saying that "some men have occasionally a morbid pleasure in hurting themselves,"—the same fact, I say, but by means of expressing a somewhat different thought. When I state the matter in this way, I am not thinking of the species, but of the small part of it only, of which I affirm the morbid pleasure. "Some men," of course, is particular [6].

In addition to these, it has been of late proposed to add to the Logical Quantities, the Half, and more than the Half, or Most. The reasons for this will not become apparent till we have arrived at the Syllogism. I must meanwhile, however, express a fear lest, in admitting these quantities, we may be mixing Mathematical with purely Logical Thought.

§ 9. QUALITY.

As Terms differ in Quantity, so do they in Quality. By the Quality of a Term is meant its being Affirmative, or Positive [7], or Negative. Every notion may be conceived as present or absent, superinduced on the

[6] In thus contending for the Universality of the Indesignate, I do not, of course, deny that a term may be used without marks of quantity as a particular. In the cases alleged, however, the whole Genus or Species is the subject; and, therefore, I maintain that the Terms are universal.

[7] As the word Affirmative has reference to a whole Proposition, it seems best, when speaking of a Term merely as such, to employ the title Positive.

state of affairs or withdrawn from it. It is to be remembered that in either case it is the same notion and has the same quantity, the relation of positive or negative, called in Logic the Quality, being the only thing different. Thus, All Men and No Men are the same notion, the species Man, and they are in the same quantity, each denoting the whole species; but in the one case the presence of the whole species is pronounced, the notion of the whole species is superinduced on the other notions with which it is logically connected; and in the other, the absence of the whole species is pronounced, the notion of the whole species is withdrawn from the other notions. "All men" means the inclusion in the judgment of the whole species Man. "No man" means the exclusion of the whole species therefrom[8].

The nature and characteristics of Negatives may be better understood by a reference to one class of them,—the Algebraic, noted by —, the sign of the *minus*. Every logical proposition, as will be shown in its proper place, is an equation of two terms; and every algebraic equation is a logical proposition. What we call the minus in Algebra is the same with what we call the Negative in Logic, and, being the same, the two follow the same rules. Thus, in Algebra, two minuses make a plus; in Logic two Negatives make

[8] Κατάφασις δέ ἐστιν ἀπόφανσίς τινος κατά τινος. Ἀποφάσις δέ ἐστιν ἀπόφανσίς τινος ἀπό τινος. Aristotle, de Interp. 6. This is a perfect account as far as it goes. Had Algebra existed in Aristotle's time, I doubt not he would have seen what I insist on, but which has never, so far as I know, been clearly perceived by the writers or learned by the readers of Logical Treatises, that the seat of Quality is in one or other of the Terms of a Proposition.

an Affirmative[9]. In Algebra, by changing all the signs on both sides the equation remains. So in Logic, by turning all the negatives into positives, and *vice versâ*, in both terms of a proposition, we propound the very same thing. Thus,

$$x + y - z = a + b - c$$
$$\therefore z - x - y = c - a - b$$

And even so, if I say, "All European nations, except the English, love to be abroad at night, and do not love coal fires," I state a proposition, the terms of which, subject and predicate, are each composed of two terms, the one positive and the other negative; in the subject, "All European nations" being a positive, "except the English" being a negative, of which "except" is the sign; and in the predicate, "love to be abroad at night" being a positive, and "do not love coal fires" being a negative. Now, if I say, "The English and no other European nation love coal fires, and do not love being abroad at night," I manifestly assert the same thing, and I do so by the process of changing all the signs on both sides. Were it convenient to employ the Algebraic signs instead of words, we might state either that

"All European nations — English = lovers of being abroad at night — lovers of coal fires;" or,

[9] This is not true in the Grammars of all languages; but in proportion as a language is without inflection, and therefore without a technical Grammar, will it be thrown on logical considerations as a substitute. There is hardly any language with which this is more the case than our own, and, therefore, in English we act on the logical principle enunciated in the text.

"All English — European nations = lovers of coal fires — lovers of being abroad at night."

Of course, except in the specific cases of Arithmetic and Algebra, we express notation by words, as in the above illustration, in which, *except*, *no*, and *not*, have denoted it.

I have brought forward this correspondence between the Algebraic minus and the negative generally, in order to show that the former is but an example of the latter. It may be well, however, to observe, that though it is thus possible to state a Proposition, of which each term, the Subject and the Predicate, shall be composed of two terms, which, as in the case before us, may be of different qualities, in logically viewing the Proposition itself we can take no account of these latter. They are but parts of the two wholes—Subject and Predicate,—of which the Proposition is made up, and each of these wholes must be regarded as of one only quality, positive or negative. Thus, "the Europeans, with the exception of the English," of our illustration, must be stated, for logical purposes, as "non-English Europeans," and then we have one positive term, and so of the others[1].

Further, some attention and thought must be bestowed on the question, When and whether a Term is negative? The mere presence of a negative word or particle is not enough to settle this. In order to have a truly Negative Term, such negative particle must be in some sort outside; the Term itself must be one and

[1] In fact, in a proposition like that in question there are implicitly at least two propositions; one affirming something of the other Europeans, another denying that same thing of the English, and in our example there are four.

the same, whether positive or negative; and the difference between its force and value in these two different conditions must consist in a difference of relation to the other terms with which it is connected; the difference between inclusion and exclusion, between superinducing upon and withdrawing from; in short, between plus and minus. If the case be otherwise, what seems at first a Negative will frequently, if not always, turn out on reflection to be an Affirmative. But this subject will, perhaps, come better before us hereafter. Only by way of at present illustrating my meaning, I will name a few cases where the Negative being part of the Term, the Term itself is to be regarded as Positive. "They are not afraid to speak evil of dignities." I suppose nearly every one here is instinctively led to throw the emphasis on *not*. By doing so in the circumstances, as we shall hereafter see, the Negative is thrown into the Term, which, there being no external negative sign disjoining or excluding it from the other terms with which it is logically connected, is a Positive. Of course, the sentence might be read with no emphasis on *not*, which would thus become the minus sign, and "afraid to speak evil of dignities" would be the Term itself—a term standing in the minus, the withdrawn, the excluded, the negative relation to the other term of the proposition. This is possible, but I cannot but think that they who enter into the writer's meaning will so emphasize the words as to refer the heretics in question positively to a class —the audacious class that is to be characterized as "non-afraid to speak evil of dignities."

With this must be classed such titles as Nonjurors, Nonconformists, Knownothings, and many others, including all single words compounded with a negative

particle, such as impossible, incorruptible, immortal, immoral, &c. &c.[2]

[2] Some light may be thrown on the considerations in the text by calling to mind that every term is capable of being both positive and negative, i. e. that a positive is the negative of a negative, which latter is in such regard a positive.

PART II.

§ 1. OF JUDGMENTS OR PROPOSITIONS.

A JUDGMENT consists in a comparison of two notions or Concepts, according to the relations of Inclusion or Exclusion, and a Proposition is the expression either in words or by means of Notation of such comparison—λόγος ἀποφαντικός.

It is obvious that of any two terms, one either includes or excludes the other, one either inheres or does not inhere in the other. If the relation be that of Inclusion or inherence, then both Terms are of necessity positive, and the Judgment or Proposition composed by them is described as Affirmative. But if the relation be that of Exclusion or Non-inherence, its being so must be caused by one of the Terms being Negative[1], in which case we style the Proposition a negative one.

None can fail to see that every Judgment and every Proposition must be the affirmation or denial of some one thing of some other, which is what is here meant

[1] Or what comes to the same thing, the proposition being an equation of subject and predicate, and the signs on both sides being changed, the equation remaining, either of the terms being negative to the other, excludes the other.

by the comparison of Terms according to the relations of Inclusion or Exclusion, &c.

Taking Propositions, then, as cognizable acts of Judgment, and therefore capable of being exactly analyzed, we find that they are divisible into three parts—the two terms which are compared, and the *copula* which indicates the fact of the comparison. The terms themselves are called respectively the Subject and the Predicate, the former being that of which something is either affirmed or denied, and the latter that which is affirmed or denied of the other.

Thus, "All men are mortal." Here there are two terms, "all men" and "mortal." Of these, "all men" gives our subject, "mortal" our predicate. We have the concept, when expressed, the Term "all men;" what we judge, pronounce, or predicate of the subject "all men" is that they are "mortal." "Are" is the copula, that which ties together or couples the two terms. This is a very simple affirmative Judgment or Proposition. Again, "No men are infallible" is an equally simple negative one; negative, because one of the terms is in the negative relation to the other, is itself negative. Equally in this case with the other have we the universal Men, the whole notion Man; but it is here a minus quantity, itself and "infallible" stand to each other in the relation of mutual exclusion, non-inherence, "are" remaining as before the copula. Once more, "Some men are not musical." We have here the two terms, "some men" and "musical;" but they are mutually exclusive,—one of them (it does not matter which) is in the minus relation to the other,—what we pronounce is not the inherence, but the non-inherence of the one in the other. "Are"

remains in this case as both the previous, the copula.

§ 2. THE COPULA.

Before investigating any further the relations of Subject and Predicate, it seems desirable that we clear our minds respecting the Copula. In the examples just given its duties are performed simply by the Verb Substantive. This however is by no means always the case. Aristotle's propositions in the Analytics are frequently expressed thus—τὸ B ἐν τῷ A παντὶ ὑπάρχει, B appertains to, or inheres in, every A, which is the same proposition as our All A's are B; but in many cases, perhaps, a more perfect expression of it[2]. And, in common speech, the Copula very frequently either does not exist at all, or is wrapped up in a word forming the whole or a part of one of the Terms. This is the case when we use other verbs than the substantive, as when we say, "It thunders," "He rushed to the fight," and the like.

Finally, the Copula is in great measure extra-logical. It supplies, for the most part, a grammatical rather than a logical want. I say a grammatical want, not a grammatical necessity; for there are languages, e.g. Hebrew, which continually dispense with it. So, too, does the speech of childhood; and so, too, very frequently, that of poetry.

It is never absolutely required in Logic unless, perhaps, in some cases to mark Negation.

As, however, it is generally used in our own and the

[2] Of course, ὑπάρχει might be considered part of one of the terms, and quite justly, but from a less scientific point of view than that which regards them as being simply A and B.

other European languages, it becomes important to disentangle it from the Terms,—important for the clear understanding of the author's meaning, for delivering that meaning with a right elocution, and for good translation of a foreign language into our own. So, too, the Terms may be composed of several words; and it will, therefore, be a question how much of such sentence belongs to them, and how much to Copula,—a question on which, as we shall by and by see, the right position of the emphasis will depend. Finally, though the verb substantive supplies us very generally with the Copula, it may itself be a term, as in the proposition "God is."

Still, the pure logical view of a Proposition only requires that we take into consideration the two Terms, of which either an expressed Copula or some mode of Notation indicates the relation inclusive or exclusive in which they stand to each other. To these Terms, therefore, let us now betake ourselves.

§ 3. THE TERMS—SUBJECT AND PREDICATE.

The two Terms of which every Proposition is composed are called, as we have seen, the Subject and the Predicate; the former being that of which the latter is either affirmed or denied. They need not be confined each to a single word, and, therefore, in the logical analysis of a sentence it frequently requires some thought to determine to which of the three members any one word is to be referred. The following considerations will assist in such determination. Whatever belongs to Copula is quite unemphatic. Where there is the slightest emphasis, we must consider the word or words to belong to one

of the Terms. The main emphasis will always be thrown on the Predicate. The reason of this is, that of the two Terms, the subject is necessarily in some degree known, and the Predicate is *the not hitherto known* respecting it. On whatever part of the sentence, therefore, we are led to throw the main emphasis, we may be sure that such part is to be referred to the Predicate.

Now, every sentence not purely interjectional or imperative either contains or suggests at least one Proposition. There are often several in the same sentence, because when we view such sentence merely according to grammatical relations, all that we have to do is to provide it with a continuous syntax. Moreover, when the sentence is but the expression of one Judgment, i. e. consists of one Proposition, it will often happen that the Terms are each a Proposition[3]. Viewed, however, in reference to the whole sentence, those subordinate Propositions must each count but for a single term, Subject, or Predicate. Every sentence, then, contains or suggests at least one Proposition. In the case of a dictum or a remark this is obvious. It is the very essence of such that they are the expressions of Judgments. But we give in a grammatical point of view the name of sentence to

S P

[3] Of Law there can no less be acknowledged, than that

P P

S P S P

her seat is the bosom of God, her voice the harmony of the world.

Here the large letters are placed over words belonging to the terms, Subject or Predicate, of the whole proposition, the smaller ones over those belonging to the subordinate propositions contained in the terms of the main one the former above, the latter below the line.

every complete period. And these, if not expressions of Judgments, i. e. Propositions, are the suggestions of such. Thus, a question is a suggested Proposition. If it begin with the verb substantive, i. e. if it be a question of *is* or *is not*, we may regard it as a Proposition, of which the person asked is to say whether it shall be propounded or not; or more simply as a Proposition waiting to have its quality, affirmative or negative, determined. If it begin with an interrogative pronoun, or with the adverbs *why*, *when*, &c., we may regard it as a Proposition waiting to have one of its terms supplied. I have excepted interjectional and imperative sentences. The former are not really sentences. Perhaps the latter ought not to be excepted, for every command can be so stated as to be a Proposition: "This is what you are to do; this is what you are not to do," &c.

Every grammatical period, then, either contains or suggests the expression of at least one Judgment, i. e. either contains or suggests at least one Proposition; and hence, doubtless, it is that we call such periods *sentences*. For further determination of the Predicate it may be worth while to remark, that in the ordinary and natural expression of the great majority of our thoughts the Subject is the seat of comprehension, the Predicate of extension. Not necessarily, however, seeing that conversion is always possible, and seeing, too, that there are Judgments without the elements of extension and comprehension.

§ 4. QUANTITY AND QUALITY.

Propositions vary in Quantity and in Quality. We have already considered these two characteristics in

reference to Terms. Let it now be said that the Quantity of a Proposition depends entirely on that of its subject, i. e. a Proposition is Universal or Particular according as its subject is either; and that the Quality of a Proposition depends on that of either Term, i. e. if either Term be negative the Proposition is negative; it cannot be affirmative unless both Terms be so.

I say that the Quantity of a Proposition depends on that of its subject. By this I do not mean to deny that the Predicate has quantity, for it is impossible to use any Term without at least mentally assigning quantity to it; but in all ordinary classification of Propositions we call those universal in which we predicate any thing of a subject in the whole extension of that subject, and those particular in which we predicate any thing of the subject in part only of its extension. In the technical language of Logic, Propositions are universal in which the subject is distributed, particular in which it is undistributed.

We have seen that the varying quantities of Terms are—

1. The Universal or Definite;
2. The Particular or Indefinite;
3. The Indesignate;
4. The Singular;

to which it is proposed by Sir W. Hamilton to add—

5. Semi-definites; and
6. Indefinito-definites.

In Propositions we may, for most purposes, content ourselves with a much smaller list, and exclude—

1. Indesignates, as being in truth always either Universal or Particular, and I think, as a rule, the former.

2. Singulars, which in Propositions have the same power as Universals. If any thing be predicated of an individual, it is plain that it must be predicated of that individual's whole extension, i. e. the Subject, the individual, is distributed, and, therefore, the Proposition is considered universal.

Contenting ourselves, then, with the views and systems of ordinary Logic, we find the quantities of Propositions to be but two, Universal and Particular, and their qualities but two also, Affirmative and Negative. The characteristics of Propositions which result from those quantities and qualities in their combination have long been noted by the vowels A, E, I, and O; A denoting a universal Affirmative, E a universal Negative, I a particular Affirmative, O a particular Negative. These vowels are said to have been chosen as being contained in the two verbs Affirmo and Nego; A and I being the first two vowels of the former, and E and O the two of the latter verb. Their respective force as noting Propositions was expressed in the Middle Ages by the following mnemonic lines:—

Asserit A; negat E: universaliter ambæ;
Asserit I; negat O: sed particulariter ambo;

which are thus freely rendered into Englsh, and expanded by Sir. W. Hamilton:—

A, it affirms of this, these, all,
Whilst E denies of any;
I, it affirms, whilst O denies,
Of some (or few or many).

Thus, A affirms, as E denies,
And definitely either;
Thus, I affirms, as O denies,
And definitely neither.

Sir William's additional quantities, the semi-definite and the indefinito-definite, if admitted, require, of course, their own vowels. He, therefore, purposes to express them respectively by U, Y, UI, and YO, and adds the following stanzas to his mnemonic verses:—

A Half, left semi-definite,
Is worthy of its score;
U then affirms, as Y denies,
This, neither less nor more.

Indefinito-definites,
To UI, YO, last we come;
And that affirms, and this denies,
Of more, most (half plus some).

Archbishop Thomson, in his "Outline of the Laws of Thought," likewise adds the vowels U and Y, but for a totally different purpose[4].

§ 5. IMMEDIATE INFERENCE.

We have not yet arrived at the third part of Logic, which treats of Reasoning and its form, the Syllogism. Nevertheless it is requisite that we give some consideration, at this stage of the subject, to Inference; for though all reasoning be Inference, it is not true that

[4] There are some other considerations connected with Logical Quantity which, as their treatment refers to the Syllogism, cannot well be considered here. I have therefore reserved them for the Appendix. Note B.

all Inference is reasoning, if at least we restrict the latter term to the complete Discursive process, in which out of the comparison of two judgments there emerges a third. But from a single judgment or proposition we may make inferences and gain thereby, not exactly a new judgment, but a presentation of the existing one under a new aspect, which, it may be, has a different bearing on our feelings or wishes than the original. Inferences from single propositions called Immediate Inferences, and by Kant "*verstandesschlüssen*," are usually regarded as of two kinds. I am sure that this division is quite inadequate, but still to these, as an outline of the matter generally received, we will, in the first instance, betake ourselves.

1. Opposition.
2. Conversion.

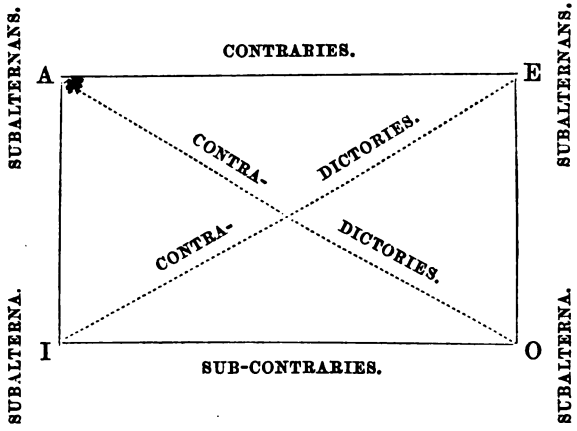
Of these opposition retains the subject and predicate, but either diminishes the quantity of the proposition, in which case it is called *Subalternation*, or retains the subject and predicate, but alters the quality, which latter alone should be called Opposition, and Conversion retains the quality, but changes subject into predicate and *vice versâ* [5]. A single proposition thus affording us immediate Inference has been called, but infelicitously, the *Exposita*, and that inferred, the

[5] In my first edition I followed Mr. Morell's division of Immediate Inference, into

1. Subalternation.
2. Opposition.
3. Conversion.

It is much better than the ordinary, but in a book like the present, it is not right to lead the reader into difference from the ordinary authorities without letting him know.

Subaltern, *contrary*, *sub-contrary*, *contradictory*, or *converse*, as the case may be[6].



Let us consider each of these a little further.

1. Subalternation is so obvious and simple an Inference that little needs be said on it. That if A be true, I must be true; and that if E be true, O must be true likewise, is plain to the dullest capacity. Plain though it be, however, in itself, it is at the root of a great deal of Reasoning or Syllogizing proper, which consists in showing of two propositions that one stands in the relation of subalternation to the other.

In simple Inference subalternation may be valuable, if our only concern being with the establishment, say of I, the readiest road to this should consist in the proof of A.

[6] In this table I have omitted the small letters n, v, i, f, with which it is usually accompanied. They relate to Modality, a subject which I exclude from this treatise, as not belonging to pure Logic.

Of the four, A, E, I, and O, A and E are called the subalternantes, I and O the subalternæ.

2. Opposition, properly so called. This has been defined as "the difference in quality between propositions which have the same subject and predicate." Given a proposition, it may be denied by contradiction, which contradiction involves an opposite proposition, or it may be set aside by the assertion of the directly contrary proposition.

Of the four, A, E, I, O, A and E are *contraries*, I and O what are called *sub-contraries*[7], A and O, and E and I respectively *contra-dictories*. Of these

A and E cannot both be true, and may both be false;

A and O, and E and I respectively cannot both, but one must, be true;

I and O may both be true, but cannot both be false.

There is thus a considerable amount of Inference to be procured by Opposition. If I disprove A, I *ipso facto* establish O; and if I disprove E, I *ipso facto* establish I; if I disprove I, I *ipso facto* establish E, and if I disprove O, I *ipso facto* establish A.

And here it may be worth while to caution the learner against supposing that, because every grammatical period contains or suggests a judgment, such judgment is always to be found in the words of the period itself. For example, St. Paul's assertion, that "all men have not faith," will puzzle any one who views it as in itself a logical proposition, and subjects it accordingly to the usual analysis. For what will

[7] Aristotle denies, and rightly, that there is any real opposition between sub-contraries.

he regard as the Terms? "All men" will, of course, seem the subject, in which case the proposition is universal, and that which is predicated must be predicated universally. What then is the predicate here of "all men"—that they "have not faith"? But this is at once felt not to be the meaning of the sentence. That all men are unbelievers is not only different from the judgment which it impresses on us, but is almost excluded by it. That the proposition is a universal one is quite contrary to the impression which it makes on us, and yet we have seen that it has the form of a universal. How is this to be explained?

The answer is, that what we are presented with is a universal proposition; but while presented with it we are told not to accept it. The proposition formally before us is, that "all men have faith," A; and this proposition is simply declared not to be true, no counter-proposition being stated. In other words, A is contradicted. But we have seen that the contradictory of A is O, and, therefore, in the very act of pronouncing A not to be true, we are forming the judgment O. When St. Paul says, that "all men have not faith," we therefore feel that we are presented with a particular, not a universal judgment,—that what he means is, that *some men have not faith.* I repeat it, "all men have not faith" is not in words a proposition, but the denial of a proposition,—a denial which, of course, infers another proposition.

This will be quite clear when we consider what would be the corresponding denial of E. We have seen that A can be denied without verbally stating the necessary inference O. But this cannot be done so easily with E. A being an affirmative can be denied by the simple insertion of the word *not;* but E being a negative, and containing therefore a negative sign,

cannot be denied by any so small an insertion. I must either do it by withdrawing the negative and at once stating the necessary inference I, or by a longer and clumsier addition to the sentence; viz. "it is not true that," &c. A corresponding denial to that given in "all men have not faith," would be, "it is not true that no men can resist temptation," which, of course, we should ordinarily prefer to state at once as I, and say, "Some men can resist temptation." And so of I and O. The easiest way of denying them is simply to assert their contradictories. Few people would be at the trouble of saying, "it is not true that some men are sinless," rather than "no men are sinless;" and still less would one care to say, "it is not true that some men are not mortal," rather than "all men are mortal."

Thus of the four, A alone can be conveniently denied in common language, otherwise than by the direct expression of its contradictory.

Before parting with the subject of Opposition, let me remark on a feature of it which may be considered to have a moral. The human mind is impatient of particular, and craves after universal, propositions. I and O are distasteful, we clamour for A and E. But the reverent and truth-loving inquirer will own that the Book of Nature and of Facts slowly and comparatively seldom advances him to the latter, and that if therefore he pronounces them, he is too often doing so without warrant. And the diffident modesty which leads him to pause long before he mounts to universals, so variedly yet continually preached by nature, would seem to have its witness, too, in the very form and laws of Thought, as exhibited by our present Science. For consider how much harder it is to prove A or E than I or O by the laws of Subalternation and Oppo-

sition. I may be proved by either—by the establishment of A or the setting aside of E, and is not disproved by the establishment of O. O may be proved either by the establishment of E or the setting aside of A, and is not disproved by the establishment of I. But E is disproved by the establishment of either A or I, and is not proved by the establishment of O or the disproof of A. So long as I is undisproved there is no arrival at E. A is disproved by the establishment of either E or O, and is not proved by the establishment of I.

This result of the very form of Thought comes out still more abundantly in the Syllogism.

3. Conversion. This consists in transposition of the terms of a proposition, the quality remaining as before. What was the subject has now become the predicate, and *vice versâ*. The new proposition, or rather the new form of the proposition thus got, is called the Converse of the original one.

Where the relation between propositions admits of a simple verbal transposition, Conversion requires no consideration, as in Morell's example, "No stones are metals," which we feel fully justifies us in saying, that "no metals are stones." But every one likewise feels, though in less obvious cases he may not always take sufficient care to remember it, that such a case as the subsequent example, "all metals are minerals," cannot be so simply dealt with; we cannot infer that "all minerals are metals." So, too, we have seen that the incontestible proposition, "all reasoning is inference," will not allow us to say that "all inference is reasoning." In both these latter cases, while we transpose we must also seemingly diminish the quantity of the predicate (I lay stress on the word *seemingly* for a reason that will straightway appear), and say, since "all metals are minerals," then "some minerals are

metals;" and since "all reasoning is inference," then "some inference is reasoning." The necessity of doing this in such cases is intuitively perceived, but it is not felt quite so easy to give the reason of it.

The usual account of the matter has been to distinguish between simple conversion and conversion *per accidens*, and laying down the rule that no term must be distributed in the converse which was not distributed in the original proposition, to pronounce that E and I can be converted, simply because in E both terms are distributed, and in I both are undistributed, so that in neither case is any change made in this respect by their transposition; whereas A must be converted *per accidens;* that is, in transposing we must also limit the quantity of that which having been the predicate is now the subject. For universal Affirmatives, it was said, did not distribute their predicates, while universal Negatives did so. A process called conversion by negation or *contra-position* has been applied to the case of O. Take Archbishop Whately's example,—"Some members of the University are not learned." This could only be converted, according to him, by taking the negation into the term "learned," thus making it, as we have already seen, an affirmative, and saying, "some *not learned* (i.e. unlearned) are members of the University." By this means the convertend O is made I in the converse, in opposition to the very notion of conversion. It is all trouble thrown away. The true converse of "some members of the University are not learned" is "the learned are not some members of the University;" i.e. some members of the University are not contained in the class "learned"—the class learned does not contain those members of the University.

§ 6. QUANTITY OF THE PREDICATE.

The foregoing principles of Conversion lie under the twofold disadvantage of being untrue and unclear. They are untrue, for many universal affirmatives distribute the Predicate. It is possible to affirm that all the A's are all the B's, in which case we may at once say that all the B's are all the A's. "These dry bones are the whole house of Israel;"—the whole house of Israel are these dry bones. And they are unclear. The whole notion of distribution is an awkward one, and almost seems to require the explanation which supersedes it.

That explanation is to be found in Sir W. Hamilton's principle of the Quantification of the Predicate. He teaches us that every term must be quantified in thought, though not necessarily in speech. On this principle the predicate must possess quantity as much as the subject, though in a whole class of cases that quantity does not require to be verbally expressed. When I say that "all men are mortal," I mean, and being perfectly understood to mean am not required to express, that "all men are some mortals,"—that they belong to the class mortals, are contained under it. Did I mean that they were the whole class instead of some of it, I should be obliged to express as much, e.g. "these dry bones are the whole house of Israel." But when I merely mark a subject as possessing a certain quality, the judgment is well understood as being to the effect that such subject amounts to some instances of that quality. When, therefore, the terms are transposed they are so mentally, by an act of simple conversion,—the only conversion really such.

The proposition "some mortals are all men" is as identical with the proposition "all men are mortal," as the proposition $x = y$ is identical with the proposition $y = x$. When I said that "all men were mortal," I meant that "all men were some of the mortals;" and, therefore, when I say that "some mortals are men," I am saying nothing new. The judgment is but simply converted, and remains in every other respect the very same as it was, only the language must be modified; for that particular quantity which was at once understood without being expressed in the predicate of the exposita, will not be understood unless it be expressed in the subject of the converse.

Every Proposition, according to this doctrine of a quantified Predicate, is an equation of its terms, and being such, can be in no degree affected by the transposition of those terms. Only, we must be careful that in transposing we do not at the same time really change either of them; and this care must have respect to the laws of Utterance, not of pure logic, which latter sees but the same act in all conversion,—the act of simple transposition.

Hence such a phrase as "that is doubtless true, but can you convert it?" is in a logical point of view absurd. If it be true, of course you can convert it. What ought to be said is, "that is doubtless true, but will the verbal transposition of the members of the period be its real converse?" If a proposition be true, its real converse must be true, being in fact the same proposition. On the other hand we must not regard that as the converse, however true, in which the Terms are indeed transposed, but one of them is used in greater extension than it had been in the exposita, and which, therefore, the exposita being

granted, will still require separate proof. We cannot call Euclid I. VI. the converse of Euclid I. V., nor the corollary of the sixth proposition the converse of the corollary of the fifth. Were they so, they would not require, as they do, separate demonstrations. The real converse of the corollary of Proposition V. is that "some equi-angular triangles are also equi-lateral;" because the exposita in truth affirms no more than that "all the equi-lateral triangles are some of the equi-angular." When we have proved Proposition VI., and thereby proved its corollary, we may enlarge that of Proposition V. into "all the equi-lateral triangles are all the equi-angular," which of course can be simply converted into "all the equi-angular triangles are all the equi-lateral."

This doctrine of a quantified Predicate not only removes all difficulty and mystery from the subject of conversion, but at once simplifies and enlarges the whole syllogistic scheme.

§ 7. INFERENCES.

I have already stated my conviction that the preceding division of Immediate Inference is quite inadequate. We are continually able to infer without syllogism in forms that cannot be brought under any of the three types with which we have just been occupied. We may even go farther. Every judgment is necessarily capable of giving birth to a whole series of immediate inferences, over and above the three hitherto considered. The most obvious classes of such are as follows:—

I. Inference by *negation*. If $x = y$, then $-x = -y$.

If all men are liable to error, then no men are not liable to error.

II. Inference by *added determinants*. Si coincidentibus addantur coincidentia, fiunt coincidentia. If $x = y$, then $x + z = y + z$. The French are mercurial, therefore the French studying logic are a mercurial people studying logic.

III. Inference from the one whole of thought to the other. His hair is red, therefore he is a red-haired man.

IV. Inference of Interpretation. A is B, therefore B exists. Stephen was a martyr; therefore there has been such a thing as martyrdom.

V. Inference from a Disjunctive Judgment. The teeth are either incisors, canine, bicuspid, or molar; therefore the molar teeth are neither incisors, canine, nor bicuspid[8].

VI. Inference from a Conjunctive Judgment. Birds are winged, oviparous, and warm-blooded; therefore there are warm-blooded animals which are winged and oviparous.

VII. Inference from the correlation of notions. If Alexander was the son of Philip, Philip was the father of Alexander.

VIII. All *equivalent* propositions may be immediately inferred from any one. All men are mortal, therefore no man can always escape death. Such equivalency in propositions exists in too great abundance to be classified.

Of some of these, while beyond doubt they belong to the class of immediate inferences, it should be kept in mind that they can also be arrived at discursively, i. e. by syllogism.

[8] Thomson's Outline of the Laws of Thought, pp. 203, 204.

§ 8. KINDS OF PROPOSITIONS.

We have hitherto been engaged with Propositions in those aspects which all of them must bear, whatever their kind. They must all be characterized by Quantity and Quality,—must all be susceptible of opposition and conversion, and on supposition of a subject being really an universal, they must possess the relation of subalternation. But with these common characteristics, they are of very various kinds, which we must now proceed briefly to consider.

§ 9. ATTRIBUTIVE PROPOSITIONS.

The great majority of Propositions which have passed under our notice have consisted in the assigning a mark as predicate to something as subject. The predicate has *qualified* the subject. By the judgment or act of predication we have assigned the subject to its class or kind. These have been called *Attributive* Propositions, under which head are to be ranged all such as have for the predicate a simple Adjective or Adverb, and all such as formally refer a whole of less to a whole of greater extension. They are also termed Propositions *de Inesse*, the notion of *in-being* or *inherence* being that which they convey. Finally they are named by Kant *synthetic* judgments, as distinguished from *analytic*, inasmuch as they combine notions originally separate. They constitute probably the majority of our Judgments altogether, but certainly the grand majority of such as are at all scientific, such as we remember, pause on, and

express with deliberation and care. Accordingly it is to them, and to syllogisms combined from them, that Logicians have for the most part confined their attention. It is in them only that the act of conversion requires care, and the syllogism shows itself in varied figures, and demands obedience to varied rules.

A curious question has arisen concerning them. We have seen that they are called Propositions *de Inesse*, Propositions of *Inherence*. But which term is inherent or in-being in the other?—the subject in the predicate, or the predicate in the subject? A mistake on this question forms part of the history of literature. An eminent Scotchman of the last age, Dr. Gillies, accused his more eminent countryman, Dr. Reid, of misunderstanding Aristotle, in reference to the predicate being in the subject. Dugald Stewart, who had for Reid all the grateful veneration of a pupil, put in a word of apology, to which Gillies replied by showing that Reid's language would not admit of the attempted defence. Neither Gillies nor Stewart suspected that Reid was all the while quite right, that he had truly given Aristotle's meaning[9]. This, however, is but an episode. To return to our question, which, subject or predicate, is in the other, which is part and which whole? we must reply that either is in the other, either is part and either whole, according as we are regarding them in reference to extension or in reference to comprehension. In reference to extension, the subject is in the predicate, is a part of which the predicate is the whole; in reference to comprehension, the predi-

[9] Aristotle recognizes the inherence both of predicate in subject, and of subject in predicate; the former in his constant form, *τὸ* A *ὑπάρχει παντὶ τῷ* B; the latter in his frequent phrase *εἶναι ἐ.*,—*τὸ* A *ἔστιν ἐν ὅλῳ τῷ* B.

cate is in the subject, is a part of which the subject is the whole. When I say that *the rose is red*, I am pronouncing it to be in the class of *red things*, to be a part of which red is the more extensive whole. But I am also pronouncing the quality *red* to be in the rose, to be a part of which the rose is the more comprehensive whole.

Hence, in this large class of Propositions, the subject before conversion will be found to be the seat of comprehension, the predicate the seat of extension. Hence, too, the noun-substantive is comprehensive, the noun-adjective extensive. The converse of course will not be so; but the converse is what has been called *Propositio inordinata*, an unnatural proposition. Except by way of immediate inference from the *exposita*, and for some purposes in syllogism, we do not betake ourselves to it. In a natural attributive Proposition, as I have already said, we may always look in the subject for the comprehension, in the predicate for the extension.

§ 10. SUBSTITUTIVE PROPOSITIONS.

But there may be Propositions in which none of the aforesaid questions have any place, propositions in which the terms have no mutual relations of part or whole, comprehension or extension, no relation but that of complete identity, and therefore perfect interchangeability. Such are called by Bishop Middleton *reciprocating*, and by Abp. Thomson *substitutive* Propositions; the latter of whom proposes to note their two varieties as respectively U and Y, vowels which we have seen to be employed by Sir W. Hamilton for totally different purposes. In such there is no difference between

Subject and Predicate, further than what may consist in the latter being the *not hitherto known*, and Conversion may be performed simply in words as well as in thought. This kind of Proposition gives birth to what we shall afterwards know as *the unfigured syllogism*. *Aristotle is the Stagirite*, *This is our new curate*, and the like, are simple cases of the reciprocal Proposition. It is easy to see that these examples admit of being at once converted into *The Stagirite is Aristotle*, *Our new curate* is this gentleman or clergyman.

Besides this great division of Propositions into reciprocal and attributive, there are some other distinctions which must be considered.

§ 11. HYPOTHETICALS.

The hypothetical proposition is that of which one member is stated as the condition of the other, e. g. "If A be B, C is D." Instead of dividing such a proposition into subject and predicate, it is usual to speak of the *antecedent* and the *consequent*.

Logicians are divided on the question, whether such propositions are formally distinct from categorical, i. e. propositions of simple affirmation or denial. With the high authorities of Kant and Hamilton[1] against me, I ought to be diffident in answering this question in the negative; but the more I consider it, the more I am constrained to do so.

Let us take the sort of example commonly presented in the first instance. "If Cæsar aimed at a crown, he deserved to die." There seems to me here but the categorical proposition, *Cæsar aiming at a crown*, *deserved*

[1] Hamilton quoting Krug. Lectures, iii. 239. But see the appendix, vol. iv. 375, for proof that Hamilton altered his mind.

to die; only the utterer, whether from doubt, or for purposes of argument, it matters not, speaks uncertainly of the real existence of his subject; and this uncertainty I maintain to be extra-logical. The case exactly corresponds with that of interrogations. In both we have real judgments, or the suggestions of such: but in both we wait for warrant to pronounce them.

But if we turn to the example which we gave at the outset, If A be B, C is D, a little more consideration is required, inasmuch as, besides the apparent dissimilarity of the hypothetical from the categorical form, we are embarrassed by having terms each of which is a proposition by itself. Let us see then what we mean when we say,

If the A's be B, the C's are D.

Surely this—

The cases (if any) in which the A's are B, are cases (if any) in which C's are B, a common proposition *de Inesse*, and coming under the ordinary laws of such. Thus it can be easily converted into,

Some of the cases (if any) in which the C's are D, are the cases (if any) in which the A's are B.

A hypothetical proposition of this kind differs from the last example in being a complete judgment, not waiting like that to have the reality of one of its terms substantiated; and it is in all respects an attributive judgment, or one *de Inesse*, no otherwise distinguished from other categorical judgments than in this one respect, that whereas they speak of the mutual relation of things and qualities conceived as actually existing, this speaks of the mutual relation of suppositions.

The subject of hypotheticals has been burdened by an introduction of questions, highly interesting in

themselves, but outside the domain, in my opinion, of logic. To this class belongs the law of cause and effect, which sometimes, though not always, seems connected with hypothetical propositions.

It is plain that when I say,

If the A's be B, the C's are D,

I may mean very different things. 1st, I may affirm that the A's being B is the cause of the C's being D, that the way to make the C's D is to make the A's B; or 2ndly, the reverse of this, that the C's being D is the cause of the A's being B; or 3rdly, that if the A's be B, it follows that the C's are D, whether by parity of reason, or by the force of some other consideration.

Of these only the last is the logical proposition. Either of the others may be intended, but *as a proposition* we have nothing to do with any view of it but the last, which exhibits its essential character in each of the three cases. In each of the three, whatever else we intend, we assert the inherence of the supposition that the A's are B, in the supposition that the C's are D, or *vice versâ*.

Thus, I may say, if the water be heated to a given amount, it will boil, or if the water be boiling, it must have been heated to that amount; or if the wind be in the south-west, the weather will be rainy; or if the suffrage be a right, women should possess it; and shall be meaning quite different metaphysical relations between the matter of the antecedents and of the consequents of these propositions: but always the same logical relation between the antecedents and consequents themselves, that of inherence of predicate in subject, or *vice versâ*. I shall be affirming that the case of the water being heated to the right amount, comes under

the cases of its boiling, and the converse; that the case of the wind being in the south-west comes under the case of the weather being rainy; that the case of the suffrage being a right, comes under the case of women having a claim to it: quite compatibly with the fact that, in another point of view, I shall be asserting in the first instance a connexion of cause and effect, in the second of sequence in phenomena, in the third of necessary result in argument. It is this last connexion which is oftenest asserted, when a hypothetical proposition is used in disputation. We wish to bring our opponent to a *reductio ad absurdum*, to warn him that if he upholds a particular position, he must be prepared to admit what we think its necessary consequent.

§ 12. COMPOUND PROPOSITIONS.

These I divide into Disjunctive and Conjunctive.

In a disjunctive proposition we give several terms, either in the subject or predicate: we say,

Either the A's, the B's, or the C's are D,
or, the A's are either B, C, or D.

Or, using negative terms,

Neither the A's, B's, nor C's are D,
or, the A's are neither B, C, nor D.

Although in the last two instances the terms are negative, the propositions are affirmative, belonging to the cases noticed in Part I. p. 56, in which the *minus*, the negative sign, is part of the term itself, not outside it, and therefore not indicative of its relation to the term with which it is compared.

Conjunctive propositions similarly contain several

terms either in subject or predicate, connecting them with the word *and* instead of *either* or neither.

The A's, the B's, and the C's are D,
or, the A's are B, C, and D.

It is manifest in both these cases that propositions of this sort really consist of as many propositions as there are notions joined or disjoined in one of the terms.

The Disjunctive *suggests*, taking the first instance given, the propositions that the A's are D, that the B's are D, that the C's are D, but does not affirm more than that one of them is true: the Conjunctive positively affirms that the A's are D, the B's are D, and the C's are D. Yet in each case there is a whole proposition, and, to compare dead abstractions with living realities, compound propositions are analogous to flowers of the composite order,—such as the daisy, wherein we have many flowers contained in one calyx.

§ 13. INDUCTIVE PROPOSITIONS.

An *Inductive* proposition is a conjunctive, wherein the conjunction in one term constitutes the division of the other.

A, B, and C, constitute the class D,
or, D consists of (is divided into) A, B, and C.

§ 14. DEFINITIVE PROPOSITIONS.

A definitive proposition is that wherein one term is the Definition of the other, e. g.,

"Hope is the looking with pleasure into the future."

Obviously both inductive and conjunctive propositions are substitutive.

§ 15.

And thus much for the several kinds of judgment or proposition. What is called the modality of judgments, which used to occupy much attention, is now rightly discarded from pure logic, and I therefore pass it over. Its difficulty led to the old maxim, "De modali non gustabit asinus," for which Sir W. Hamilton substitutes "De modali non gustabit logicus." Whether we look at the leading models of Aristotle, the *necessary*, the *impossible*, and the *contingent*, or at the multitudes subsequently added, so as to recognize nearly all qualification of leading terms by adjectives or adverbs, we must view them as belonging to the *matter*, not to the *form* of thought, i. e. they are affections of the thing thought about, not of our thought about it.

PART III.

ON SYLLOGISM.

§ 1. AXIOMS.

I. THINGS which are equal to the same are equal to one another.

II. A part of a part is a part of the whole.

III. A predicate of a predicate is a predicate of the subject.

IV. A predicate of a definition is a predicate of the thing defined.

V. A predicate of every member of a division is a predicate of the divided whole.

§ 2.

As each judgment or proposition is a comparison of two Concepts or terms, so is each act of reasoning or Syllogism a comparison of two judgments or propositions. When such comparison is made in obedience to the necessary conditions of discourse, it gives birth to a third judgment or proposition. Thus out of two truths already ascertained there emerges a third not before ascertained. And thus acts of reasoning or discourse proper differ from the inferences which have as yet come before us; they, as we saw, not being

new truths or new judgments, but merely new aspects of the truths which we have already ascertained, and the judgments which we have already formed.

I have just said that when a comparison between two judgments is made in obedience to the necessary conditions of discourse, it gives birth to a third. This qualification *in obedience to*, &c., is plainly needful, for the youngest child can see that two Propositions may be brought together which can by no possibility give birth to a third. Thus if I say that *the stars are shining*, and that *velvets are soft*, I can by doing so arrive at no third proposition, for the two which I have stated are without mutual relation, contain no common element. But if I say that *metals are malleable*, and that *gold is a metal*, I state two propositions having a common element, the term *metal*, through which common element, as the channel of comparison between them, they give birth to a third, viz. that *gold is malleable*. Two propositions then, *containing but three terms between them*, lead by means of the term that is common to both, to a third proposition, or as we say, conclusion; and this whole process is called a Syllogism. And Syllogism, however disguised in accidents, both of the presentation and the expression of thought, is the essential form of all reasoning whatever. Any single act of reasoning can be almost at once exhibited as a Syllogism; and what we call a train of reasoning is either a syllogism, or two syllogisms, or more. This plurality of syllogisms in any complicated reasoning may either consist of several syllogisms in succession, or of one great syllogism, the terms and premisses of which are themselves reasoned out in syllogisms.

And not only does all avowed reasoning thus con-

sist of syllogism, but a great, perhaps by much the greater part of common discourse, whether in the form of persuasion or earnest presentation of truth, or what would on a hasty glance be supposed to be mere affirmation or denial, mere expression of opinion one way or other, does the like.

A few illustrations of these positions may be advisable; in order to furnish which, it may be well first to exhibit a syllogism in its essential form.

We have seen that it consists of two propositions with but three terms between them, having therefore one in common, and of a third which is in those circumstances produced by them. The two propositions already known are called *the premisses;* the third arrived at by means of them is called the *conclusion* [1]. The premisses in the case of a large class of syllogisms are distinguished as the Major and the Minor Premiss, for a reason which will be explained hereafter. Thus, in the following,

All men are mortal,
Socrates is a man,
∴ Socrates is mortal,

the first proposition, "all men are mortal," is called the Major Premiss; the second, "Socrates is a man," the Minor; and the third, "Socrates is mortal," the Conclusion. It will be seen that we have here three propositions, of which the third contains no terms not entering into the two former, and that the two former have but three terms between them—*men* or *man*, *mortal*, *Socrates*, of which men or man is common to

[1] By Aristotle, Συμπέρασμα, if viewed in the Syllogism, *the problem* if viewed out of it. In this latter regard, it is called in Latin the *Quæstio*.

both[2], what is technically called the *Middle Term*. It is by comparing both the other two, *mortal* and *Socrates*, with this Middle Term, that a relation is established between them and a conclusion arrived at.

Here, then, is a mental act, which we are disposed to call at first sight childishly simple and obvious. It exhibits notwithstanding, as I have said, the essential form of all reasoning whatsoever. The experiment, had experiment been needed, has been tried with Euclid, the first six books of which have been set forth in syllogistic form, an inconvenient way of presenting geometrical reasoning certainly, but one which exhibits it in its very essence. Let us, however, try a more concrete example. The opening of the Epistle to the Romans is a piece of consecutive reasoning. The thesis of this part of the epistle is the doctrine of justification by faith. In order to establish this, the Apostle undertakes to prove as a preliminary that no man can be justified by works of law. This comes out in two syllogisms—

Jews and Gentiles = all men (suppressed premiss).
Gentiles are sinners, and Jews are sinners.
∴ All men are sinners.

Sinners are incapable of being justified by works of law[3] (suggested premiss).
All men are sinners.
∴ All men are incapable of being justified by works of law.

I have spoken in these two illustrations of suppressed

[2] The change from plural to singular, from *men* to *a man*, is of course a merely grammatical affair. It can easily too be avoided. We may say, All that is *human* is mortal, Socrates is *human*, therefore, &c.

[3] Rom. iii. 19, 20.

and suggested premisses. This is a subject which will find a proper place for its consideration hereafter, but a little reflection will show the veriest beginner that a judgment may be quite essential to the validity of his reasoning, which there is no occasion for him to state in words, either from its being self-evident, or previously proved, or for any reason admitted by both parties in the dispute.

It is right, too, here to remark that while the syllogism is the essential form of all reasoning, expressed and even mental reasoning nevertheless by no means generally travels from premisses to a conclusion. In the majority of cases the journey is in the opposite direction. We state a judgment and proceed to give the premisses as *our reasons* for it, the *therefore* of a syllogism regularly drawn out becoming *because* in this mode of expression.

To return to our example, "all men are mortal," &c., I have said that such a syllogism is a mental act which we are disposed to treat at first sight as something childishly simple and obvious. And so indeed is any syllogism when purely exhibited. From the very nature of the case—from the truth that the conclusion follows from the premisses by the necessary laws of thought, it would be impossible that it should be otherwise. Reasoning, therefore, simply as such, instead of being an arduous mental exertion, the capacity of which belongs to but few, is so necessary and immediate that the mind performs it without resistance and without effort. But when we speak of reasoning in ordinary language, we mean, not merely the syllogism, but the whole process of ascertaining and combining the elements of a syllogism,—the discovery and recollection of premisses,—the clearing away of all that is

extraneous and ambiguous from terms,—which are processes always demanding more or less of mental effort, and the power of performing which exists in various degrees in various men. In this ordinary and wide sense of the term, the power of reasoning does indeed belong to comparatively few.

But this very simplicity and obviousness of syllogism in itself, so far from being derogatory to its worth, is the very ground of its utility and value. For as we do not ordinarily reason in pure syllogistic form, and as it would be, for the most part, inconvenient and ungraceful to do so, our best reason for ever having recourse to that form is to put the validity of our reasoning to the test. Since, if it be valid reasoning, the syllogism must be its pure form, its refusal to exhibit itself in that form at once condemns it. And, for the purposes of a test, the simplicity and obviousness of syllogism are precisely the characteristics to be desired. However specious bad reasoning may be when ingeniously set forth in speech, its invalidity is too absurdly conspicuous when exhibited in syllogism to be entertained by the feeblest understanding for a single moment.

Again, I have said that not only does all avowed reasoning consist of syllogism, but also a great, perhaps by much the greater, part of common speech, whether in the form of persuasion, or earnest presentation of truth, or what would on a hasty glance be supposed to be mere affirmation or denial. I proceed to illustrate each of these.

1st, *Persuasion*—

Therefore, Jew,
Though justice be thy plea, consider this,

That in the course of justice none of us
Should see salvation; we do pray for mercy,
And that same prayer doth teach us all to render
The deeds of mercy.

Here there is an obvious syllogism—

None who need mercy should exact strict justice;
But all men need mercy;
∴ No man should exact strict justice.

Earnest presentation of truth—

Oh! reason not the need; our basest beggars
Are in the poorest thing superfluous.

The reasoning here is that—

What applies to every thing characteristic of man cannot be made an objection to any one thing.
Superfluity applies, &c.
∴ Superfluity cannot, &c.

Mere affirmation or denial—

M. —, being a Frenchman, cannot, with all his admiration of England, believe that the Duke of Wellington won the battle of Waterloo.

This comes out in the following syllogism:—

No Frenchman can, &c.
M. — is a Frenchman.
∴ M. cannot believe that, &c.

And even when ordinary speech does not present us with a complete syllogism, it will be found to supply the wanting elements of one in the previous conver-

sation. Thus when a man says, "*I* never saw a case of," or "*I* never met with a case of," or "*I* never heard of such a case," he is always furnishing what is to him at least a premiss. What he says always has the force as a consideration of A or E.

It may thus be seen that much, not commonly recognized as reasoning, much of ordinary thought and speech, can be analyzed into syllogism. I have further to add, that syllogism is the measure of our exact knowledge. When we know something of the materials of such truth as coming within the scope of formal thought, might be exactly known, but, not knowing all, do not arrive at the truth, it is for want of one of the premisses of a syllogism.

For example,—A Gothic ruin is seen by some ordinary labourers, who observe that among most of the principal mouldings there is an ornament in profile like a shark's tooth.

Professor Willis knows that such an ornament in a really old specimen proves that it was built in the thirteenth century, but has never seen this ruin, and does not know that the ornament exists there.

Neither he nor the labourers know that it was built in the thirteenth century, but could they bring what they do know together, they would both arrive at the conclusion that it was. As it is, both fail for want of one of the premisses of the requisite syllogism; the labourers being in possession of what is technically called the minor, but ignorant of the major, Professor Willis aware of the major, but ignorant of the minor. The whole syllogism is as follows:—

All really old buildings with the shark's tooth ornament belong to the thirteenth century.

This really old building has the shark's tooth ornament.

∴ This really old building belongs to the thirteenth century[4].

We have thus seen that a great deal more than avowed or recognized reasoning is essentially syllogism —a great deal which the mind performs by no conscious effort. In truth the great majority of our syllogisms would seem as immediate as intuitions. It is only when subjected to the logical prism that they are resolved into their elements of Terms, Premisses, and Conclusion.

And this leads to a consideration, which might well have previously come before us, but which certainly ought now to receive its share of notice. Much that might, on a hasty glance, appear to belong to the simpler elements of Discourse, the matter of the first and the second parts of Logic, turns out, as I have just observed, to be resolvable into Syllogism. And, in truth, the three stages of mental process, the three parts of Logic, must be taken as a succession, not of time but of order. Except in a stage of formation, præ-historical in the case of us all, we cannot establish a chronological sequence, first of Concepts, then of Judgments, then of Reasonings. There are no concepts but those primary ones just referred to which lie beyond the individual's memory, and therefore cannot be accounted for by his conscious history, which do not imply some act of judgment as a condition of their existence; and a large, if not by far the larger portion of our ordinary

[4] I am indebted for this last case of unsuspected syllogism to that ingenious book, Mr. Gilbert's "Logic for the Million." I forget the illustration which he gives.

judgments are resolvable into Syllogisms. Here, then, we see what may be called the productive and fertilizing power of thought. Each higher phase, including the lower elements, can and does become one of those lower elements in reference to a still higher phase, —syllogisms becoming propositions, and propositions becoming terms, nay, syllogisms themselves supplying terms, giving birth to more comprehensive propositions and more elaborated syllogisms. Thus each ascent becomes when gained but the lower step to a still higher ascent; thus thought possesses a self-agglomerating power, ever swelling its volume, and multiplying its elements, but still subordinating all to their proper place in that simple form which it preserves through all this continually augmenting growth.

§ 3. KINDS OF SYLLOGISM.

For many ages the far-famed *dictum* of Aristotle, "De omni et nullo," was considered the fundamental basis of all syllogism. It amounted to this—that whatever is affirmed or denied of the whole of a class, the same is necessarily affirmed or denied of every part of such class. But this involves the notion of class, which is only to be found in propositions *de Inesse.* Syllogisms, as we shall directly see, can be composed of any kind of proposition, and therefore there must be many to which the Aristotelian *dictum* furnishes no applicable canon. Even in the case of propositions *de Inesse*, its adequacy as such may be questioned, but with this we have nothing to do at present,—our business being to consider the great divisions of syllogism. And these are two. All syllogisms are divisible into the unfigured and the figured.

I. The unfigured syllogism is produced by two substitutive propositions, of which, therefore, the terms stand in no relation to each other of breadth and depth,—of containing and contained,—of major or minor,—but merely that of equivalency. Subjects and predicates, therefore, may change places at pleasure, and the syllogism consequently takes no determinate figure:—

B C

e. g. B is C—The preacher yesterday was Mr. A.

B

This is B—*This* gentleman is yesterday's preacher.

C

∴ This is C— ∴ This is Mr. A.[5]

It is obvious that this is a syllogism, and as obvious that its meaning is equally clear, and its force equally cogent, in whatever way we choose to arrange the premisses and terms. It can be seen, too, at a glance to be quite independent of the Aristotelian *dictum*. Its real canon is given by Sir W. Hamilton, as follows:—

"In as far as two notions either both agree, or one agreeing the other does not, with a common third notion; in so far these notions do or do not agree with each other."

When we have stated this canon, we have stated all that requires to be said in explanation of the unfigured syllogism. And yet, humble as it is in the way of supplying materials for speculation or discourse, some of the most important of ordinary arguments consist of one or more syllogisms of this kind. A man is

[5] In spite of high authority, I claim this example for a syllogism.

hanged on the strength of one or more of them, and algebraic results are reached by the same.

II. The *figured* syllogism requires a good deal more consideration. When the propositions are *de Inesse*, it is obvious that the terms are in the relations of breadth and depth—of containing and contained—of part and whole. In order that they may constitute affirmative syllogisms, it is requisite that the three terms of the premisses be in three different degrees of extension or comprehension, of which the two extremes are respectively distinguished as the major and the minor; and that with which they are compared is called the *middle*, for another reason than its mere serving the end of a *medium* of comparison. It is in the intermediate quantity, being contained by the major, and containing the minor.

Thus, in the following,

All the feline kind are digitigrades,
Panthers are of the feline kind,
∴ Panthers are digitigrades,

the foregoing conditions are combined. We have three terms in three different degrees—first of *extension* :—

Digitigrades, which is the greatest—the *major*; *panthers*, which is the least, and being compared with the other extreme, is called the *minor*; and the *feline kind*, which is obviously less than the *major*—digitigrades, and obviously larger than the *minor*—panthers; obviously contained by digitigrades, and containing panthers; and, therefore, as well as because of its being the medium of comparison, called the *middle*.

Next of *comprehension* :—The syllogism will be the same, the *vis consequentiæ* identical, if we give it thus :—

Felinity is part of panther,
To be digitigrade is part of felinity,
∴ To be digitigrade is part of panther.

I say that this is the same syllogism as the other. The terms are the same, the premisses essentially the same, the conclusion the same, the middle the same; but in consequence of the whole moving in a counter direction to the previous, that of comprehension, what was the major, *digitigrade*, has now become the minor; and what was the minor, *panther*, has now become the major.

It is plain that the Aristotelian dictum, *de omni et nullo*, applies only to figured syllogisms; and equally plain on reflection that it does not so universally to them. We have to seek, therefore, for a more fundamental and universal canon. Sir W. Hamilton supplies us with the following: "What worse relation of subject and predicate subsists between either of two terms, and a common third term, with which one at least is positively related; that relation subsists between the two terms themselves[6]." The *worse* relation is the particular as compared with the universal, —the subaltern as compared with the general; and in the opinion of some, though not of Sir W. Hamilton, the negative as compared with the affirmative.

Sir W. Hamilton's principle of a quantified predicate, and the extended survey of syllogism which is now taken by logicians, have set aside some of the old rules of syllogism as regards our inspection of the process of thought. But as it is admitted that the

[6] This canon is supreme over all figured syllogism; but that of unfigured syllogisms given at p. 97 applies to both kinds, and is generic, while this is but specific.

predicate is not quantified in the *ordinary expression of thought*, it seems to me that those rules have still their value and their force as regards such ordinary expression in the case of the syllogisms to which they apply, and which probably constitute the majority of syllogisms altogether. We will therefore proceed to their consideration, and the perfectly demonstrative reasons on which they are founded.

It is not our present business to pause on the vitiating results upon reasoning of ambiguous terms. Whenever such ambiguity exists, we have not yet got the materials of a syllogism,—we cannot be sure that we are furnished with but three terms; for such as are ambiguous are the same terms only to the ear, and if used in one possible sense in one premiss, and another in the next, they will give us in reality *four* terms. But assuming that we have our three terms, and that they are really understood, the comparison of them will result in syllogism only on the following conditions:—

I. *The middle must be once distributed.* If not, we may, for aught we know, have four terms; it being possible that, if the middle be undistributed in both premisses, we have it used in one part of its extension in the one, and another in the other, so that it would not be really one term but two [7].

II. *Neither extreme must be taken more universally in the conclusion than in the premisses.* Where this is done, we have what is called an *illicit process* of the *major* or the *minor*, as the case may be. The reason of this rule is similar to that of the foregoing. A term

[7] The middle, I say, must be once distributed, and this is usually in one of the premisses. But if we *can be sure* that it is more than distributed between the two, valid inference may be arrived at. Of this in its proper place.

taken in a greater than its previous extension, is not the same but a different term.

III. If both premisses be particular, no conclusion can be drawn. In this case, there will either be no distribution of the middle, or else an illicit process of at least one of the extremes.

IV. If both premisses be affirmative, the conclusion must be affirmative also. This is self-evident. Perfect agreement can give us no materials for inferring disagreement [8].

V. If both premisses be negative, there can be no conclusion. Agreement can in no way be affirmed from perfect disagreement.

VI. The conclusion must always follow the weakest part. The particular is always held to be weaker than the universal, the subaltern than the more general, and, by most logicians, the negative than the affirmative. The case here is analogous to construction, in which it is an axiom that no structure is stronger than its weakest part. Mr. Morell's remarks sufficiently vindicate the application of the principle to Logic. The laws of subalternation give us the result as regards particulars: the self-evident position, that agreement cannot be inferred from disagreement, as regards negatives.

Therefore, if I or O appear in the premisses, the conclusion must be either I or O. If E and I, or E and O, the conclusion must be O. In the former case, E in the premisses will determine the conclusion as negative, therefore either E or O; and I will determine it as particular, therefore not E but O. In the latter E will do the work already assigned to it, fix the conclusion

[8] Of course a negative can be got by immediate inference from the affirmative conclusion.

as negative; O like I will fix it as particular, in this case, because of E and of itself as O.

§ 4. OF MOOD.

The Mood in which a syllogism is said to be, is constituted by the particular combination of three out of the four vowels, A, E, I, and O, by which it may be denoted.

Thus AAA, EAE, EIO, are in the different moods thus indicated. If we by mere arithmetical process ring changes on the vowels, we get sixty-four combinations. Of these by far the greater number are invalid, and two useless, one or other, amounting to fifty-three, leaving these eleven, AAA, AAI, AII, AOO, AEE, AEO, EAE, EIO, EAO, IAI, and OAO, which are good. IEO, according to some logicians, makes a twelfth. The majority, however, condemn it, but unjustly.

§ 5. OF FIGURE.

These Moods appear in different ways, according to the *Figure* in which the syllogism is said to be. Figure is determined by the position of the middle term. That may either be the subject of the premisses, or the predicate; or it may be the subject of the one, and the predicate of the other. Accordingly there are four figures of syllogism.

I. That wherein the middle term is subject of the major, and predicate of the minor.

II. That wherein the middle is the predicate of both premisses.

III. That wherein it is the subject of both.

IV. That wherein it is the predicate of the major and the subject of the minor.

The following well-known mnemonic verses give us the valid syllogisms which emerge out of the combinations of Mood and Figure :—

1st. bArbArA, cElArEnt, dArII, fErIOque prioris
2nd. cEsArE, cAmEstrEs, fEstInO, bArOkO, secundæ;
3rd. Tertia dArAptI, dIsAmIs, dAtIsI, fElAptOn,
bOkArdO, fErIsOn, habet
quarta insuper addit,
4th. brAmAntIp, cAmEnEs, dImArIs, fEsApO, frEsIsOn [9].

Each of the proper names in these lines gives us a distinct form of syllogism, the vowels indicating the mood, the verses telling us the figure, to which it belongs. The names should always be written as above, with the vowels only in capitals. Some of the consonants play a part, which will afterwards appear.

Of these figures, the first is incomparably the most graceful. In it alone does the Aristotelian dictum come out clearly as the principle of inference; and, consequently, so long as that *dictum* was considered the fundamental canon of syllogism, the first figure was regarded as the true type, to which syllogisms originally cast in the remaining figures had to be reduced, in order to have their validity ratified. Only in this figure, moreover, can all forms of proposition,

[9] This mnemonic has sometimes varied a little, but not so as to require notice here.

About the time of its first appearance, there came forth among the Greek logicians the following:—

Fig. 1. γράμματα, ἔγραψε, γναφίδι, τεχνικός.
„ 2. ἔγραψε, κάτεχε, μέτριον, ἄχολον.
„ 3. ἅπασι, σθεναρός, ἰσάκις, φέριστος, ἀσπίδι, ὅμαλος.

This mnemonic is inferior to the Latin, and only designates by means of the vowels, the consonants indicating nothing.

A, E, I, or O, be proved, and only in this figure can A be proved at all. The second figure can prove none but negatives; the third none but particulars. The fourth can prove every thing except A; but it is so clumsy and unnatural, being in truth but an awkward inversion of the first, that it is taken little account of. It is unknown to Aristotle, and its introduction has been ascribed to Galen[1], for whom, in such case, it is well that he has more substantial claims on the gratitude and admiration of mankind.

The reasons of the above-mentioned limitations of power in the second and third figures are of demonstrative character, as are indeed all the rules of syllogism. I have thought it worth while to give a specimen of such demonstration in the notes, but must proceed in the text to other matter.

It has been already stated that the Hamiltonian doctrines have set aside many of the old rules of syllogism. In particular the principle of a quantified predicate will be found to do away with the limitations that have been generally put upon the second and third figures, and to bring down the whole distinction of figure to the level of accidental variation in form.

Express the quantity of your predicates, and you may quite easily bring out affirmative conclusions in the second, and universal conclusions in the third, figure.

Still the old rules seem to me in force as regards *the ordinary expression* of propositions *de Inesse;* and there may therefore sometimes be occasion for remembering them. Thus should we come across specious

[1] This, after research, has been denied by Archbishop Thomson.

and showy reasoning, and find that the middle term is the predicate of both premisses, it may be well to remember that none but a negative conclusion can be expected; and to ask ourselves whether a negative conclusion be what is wanted in the circumstances.

§ 6. REDUCTION.

We have seen that so long as the dictum *de omni et nullo* was held to be the supreme canon of syllogism, it necessarily followed that syllogism was fully represented in the first figure only. Hence, syllogisms in the other figures were held valid or not according as they did or did not admit of exhibition in the first. In order to procure such exhibition, a distinct Art was invented, called that of Reduction. The words composing the mnemonic verses, *Barbara*, *Celarent*, &c., are so formed as to furnish the materials for practising this art.

I have already remarked of these words that their vowels only should be written or printed in capitals. The use of these vowels is already known to the reader. The consonants are so contrived as to indicate the mood of the first figure to which a syllogism in any of the others is to be reduced, and the mode by which the reduction is to be effected. It will be observed that the names of moods in the second, third, or fourth figures, have for their initial letters one or other of the initials of moods in the first, b, c, d, or f. It is thus indicated that the syllogism is to be reduced to that mood of the first figure which has the same initial with its own. Thus a syllogism in *Cesare* is to be reduced to *Celarent*, one in *Darapti* to *Darii*.

Next, the consonant *s* indicates that the proposition denoted by the vowel which precedes it, is to be converted simply, e. g. the E of *Cesare; p*, that the conversion is to be *per accidens*, e.g. the second A of *Darapti; m*, that the premisses of the syllogism are to be transposed, e. g. the A and first E of *Camestres*. These complete the method of what are called *ostensive* reductions, i. e. reductions which consist of an exhibition of the identical reasoning expressed in a syllogism of the other figures, in a syllogism of the first. All the moods are susceptible of *ostensive* reduction, except *Baroko* and *Bokardo*, which can only be reduced by the method called *reductio ad impossibile*, of which an account must now be given.

The initials of both these moods show that they must be reduced to *Barbara*. But it is plain on the face of the matter, that such reduction cannot be like those we have been considering *ostensive*,—cannot be the mere exhibition in a different form of the reasoning we had already expressed,—since A and O are different, and indeed contradictory, conclusions. We therefore proceed as follows:—We consider *k* to indicate that we must have recourse to the *reductio ad impossibile*, which is to be effected by discarding the proposition denoted by the vowel immediately preceding, and substituting the contradictory of the conclusion. Thus bArOkO is to be reduced by omitting the minor O, and substituting the contradictory of the conclusion A. We have thus bArbArA; but this contradicts not merely the conclusion, but the omitted minor; and as in a syllogism the premisses are always taken to be true, the A of our new conclusion must necessarily be false, and its contradictory O is consequently established. The same thing can manifestly be done with bOkArdO.

Archbishop Whately adopts a simpler, and in many respects a preferable, method. Taking *k* as his symbol, he would make it indicate that you are to apply to the proposition denoted by the preceding vowel the process of *conversion by contraposition*, and by this means reduces *Baroco* and *Bocardo* to *Darii* and *Ferio* respectively.

Every one, however, must feel that the conclusion of a good syllogism in any of the figures follows from the premisses as necessarily as it does in the first. If I say that no men are perfectly holy, and that all angels are perfectly holy—*Cesare*, I am as irresistibly driven to the conclusion that no angels are men, as if I said no perfectly holy beings are men, all angels are perfectly holy—*Celarent*. In the former case the *mind* requires nothing more for absolute certitude. It is therefore a mere rule which bids it reduce the reasoning into the latter form, and plainly an unnecessary one. In other words the dictum *de omni et nullo* cannot be the real canon of syllogism, and we have already rejected it as such. If all this be so, the art of reduction is unnecessary. Its practice is a mere waste of time, except in the case of the fourth figure, and is only desirable there because of the superfluity and clumsiness of that figure[2].

[2] Lambert did away with the necessity of Reduction, by assigning its own dictum to each figure. Though these *dicta* of his are in themselves inadequate to the larger view of syllogism which has since been taken, and though they are superseded by the Hamiltonian canons, they are not without their value in regard to syllogisms made up of propositions *de Inesse*, and I therefore here subjoin them.

1st Figure.—*Dictum de omni et nullo.*

What applies to all A applies to every A.

I speak here merely of the old Reductions into the first figure. It may be a profitable exercise to reduce an unnatural and awkward syllogism into its spontaneous and graceful shape, e. g. *Fesapo* not to *Ferio*, but *Felapton*.

2nd Figure.—Dictum de diverso.

Things that are separate do not come together.

3rd Figure.—Dictum de exemplo.

If we find any things A which are B, then some A's are B.

4th Figure.—Dictum *de reciproco*.

If no M is B, no B is this or that M.

If C is or is not this or that B, then there are or are not B's which are C's.

Dean Mansel improves these *dicta* as follows :—

Fig. 2. If a certain attribute can be affirmed or denied of every member of a class, no subject of which it cannot be thus affirmed or denied belongs to such class.

3rd Figure.—Dictum de exemplo.

I. If a certain attribute can be affirmed of any portion of a class, it is not incompatible with the differentia of such class.

II. If a certain attribute can be denied of any portion of a class, it is not inseparable from the differentia of such class.

4th Figure.—Dictum de reciproco.—Converted conclusions which explain themselves.

The first figure avails for classification, the second for distinction, the third for exception, the fourth for the bringing out of a converse. Lambert, *Neues Organon*, B. I. § 232.

In the third figure, that of *de exemplo*, we can often prove that one at least of a class has some property which is in question : thus,—to take Lambert's instance,—

The earth is a planet.
The earth is inhabited.
∴ One planet at least is inhabited.

Now in Logic we generally treat a singular as an universal. But *one at least* is indeterminate, and therefore particular. See Note E.

§ 7. KINDS OF SYLLOGISM.

Although the figures are no longer regarded as essentially distinct from each other, and although all syllogisms must come under the two great heads of figured and unfigured, there remain some subordinate diversities which demand consideration. These may be divided into, first, variations of outward form, and secondly, variations in the character of the propositions of which syllogisms are composed.

I. DIVERSITIES OF OUTWARD FORM.

§ 8. THE ENTHYMEME.

This term has taken an established place in our logical systems, to designate a syllogism of which one member, either a premiss or the conclusion, is suppressed, and has been ridiculously derived from ἐν and θυμὸς, as though it denoted something in the mind, and not outwardly expressed. By Enthymeme Aristotle meant an altogether different thing, and one with which we are not here concerned. I will however take Enthymeme in its use subsequent to him, and denote by it, in common with most logicians, a syllogism with one premiss, or the conclusion suppressed. This, as we have already seen, is very common, and appears in perhaps the greater part of reasoning, assuredly by far the greater part of conversational reasoning. In the grand majority of cases, there will be no occasion for stating both premisses; either from one of them being self-evident, or agreed upon by both parties, or previously proved. Descartes's celebrated "Cogito ergo sum" is an instance of this, the suppressed premiss being "quicquid cogitat est."

Whenever we merely give a fact, and what we consider its reason, i. e. whenever we state two propositions, connecting them by the word *because*, we make use of the Enthymeme. *He is happy because he is contented*, is one with the major premiss, "All contented people are happy," suppressed as being needless to state.

The suppressed premiss may be either the major or the minor, according to circumstances, i. e. according to which is thoroughly known and admitted. If music be proposed in company, in answer to the question whether it will not bore Mr. B? I may answer, "Why, all the B's are music mad!" Here the minor, "This is one of the B's!" is suppressed as being perfectly known. If the question be, "Won't music bore that gentleman?" it will be natural to say, "Oh! no; he is a B;" the interrogator being well aware of the universal love of music in that family, so that there will be no occasion to state the major.

In the conversational use of the Enthymeme, as well as in much formal reasoning, it is common as has been already remarked, to state the conclusion first, and vindicate it by one of the premisses, *because* taking place of the *therefore* of a regular syllogism. That is, as our thoughts naturally evolve themselves as organized wholes, we vindicate them by analysis, instead of, as in formal Logic, constructing them by synthesis.

The necessity of both premisses to the conclusion comes into distinct manifestation when an Enthymeme is disputed. When we are presented with one, of which we do not admit the force, we commonly meet it by supplying the suppressed premiss, and especially in the case of that being the major, by doing so in the

way of interrogation, daring the other side to accept it. If a man says that the virtue of Scipio could not be genuine, for he was a heathen, we exclaim, "Do you mean to say that no heathens were ever really virtuous?" This is frequent in every sort of disputation; eminently so in such as relate to ecclesiastical position and church privileges.

The Enthymeme, in which the conclusion is suppressed, scarcely demands notice. Given the premisses, that follows so necessarily that both parties see it.

In fact, we may go farther, and say that we frequently express only one premiss: the conclusion being the question present to the mind of both parties, and one of the premisses, for the reason that we have already considered, being acquiesced in by, or obvious to, both. "Is he musical?" "Why, he is a B!"

This may suffice for the uttered Enthymeme, and it must be abundantly clear that it constitutes no real variety of the syllogism. The whole *vis consequentiæ* depends on the principles of that, and can always be brought out in the full form of that, at a moment's notice.

But the Enthymeme occurs in merely mental process, just as much as in uttered argument. There is continually a member of the syllogism, of which we need not, and therefore do not, consciously think; of which we only do consciously think when it is rendered doubtful to us. Just as the eye unconsciously takes in a number of objects in the scene before it, and we are only aware of its having done so when some one of these having been removed, we feel that the picture is no longer what it was,—so does the mind really take cognizance of all the members of the syllogism, but does not feel that it has done so, unless one of them be

doubted or denied. The amount of latent thought and recognition in all mental process must ever be kept in mind, and much error results from overlooking it.

Of this, Mr. Mill's denial of the syllogism, as the essential form of reasoning, is a marked instance. He values it greatly as, what it undoubtedly is, a thorough test, and therefore a good register, of reasoning. But we arrive at our conclusions, according to him, without it. We reason, he says, from particulars to a particular. We conclude of a given man that he will die, because we have observed of several men resembling the given one in every other essential point, that they die. The countrywoman who predicts the issue of disease in her neighbour's child, on the ground that "My Lucy was just the same," gives us the type of the mental process[3].

Now it does seem an odd departure from ordinary practice to find the type of any thing in its imperfect, slovenly, and precarious, rather than its perfect, accurate, and valid, form. Good reasoning, not bad, is surely the true type. But even when the mind illegitimately passes, as I fully grant it is continually doing, from particulars to a particular, it is still by way of syllogism. This is manifest in the fact, that the moment we doubt our particulars constituting an universal, we doubt our conclusion. Supposing Mr. Mill's view of our way of arriving at the belief that a particular man will die were true, it still remains that if ever we doubt John, Thomas, &c., being equivalent to all men,—if ever we doubt the major premiss that all men are mortal,—we shall also doubt the mortality of any particular man as man. Therefore such

[3] Mill's Logic, vol. i. p. 239, sixth edition.

major premiss, whether warranted by the facts of our observation or not, is latently present in the mind, and takes its part in guiding that mind to its conclusion.

Let us, however, examine Mr Mill's examples a little more closely. His first, our assurance that the Duke of Wellington, who was alive when he wrote, must die, is a singularly unfortunate one, inasmuch as his supposed mental process from John, Thomas, &c., to the Duke of Wellington has no counterpart in experience. He never saw a man who was thus led to foretell the Duke of Wellington's death. He never saw a man who was not in possession of the universal major, "All men must die." He never saw a man on whom that universal proposition was not dogmatically imposed from his earliest childhood, or who was ever led subsequently to doubt it. We have therefore to suppose his case without aid from experience. Let us do so. Let us suppose in the earliest ages of humanity some one in possession of no revelation or dogma on the subject, and to whom his own or another man's mortality could be matter of question. I fully grant that he would reason in the way Mr. Mill describes, but he would do so by considering John, Thomas, &c., as equivalent to all men. His mind would not consciously pause on this, but in the fact that he considered his observations sufficient to warrant the conclusion, there would be a latent recognition of it, as well as in the fact that if he doubted the sufficiency, he would doubt the conclusion.

The other illustration, the country-woman's "My Lucy was just the same," is susceptible of more interpretations than one. The good woman very probably considers, as the uneducated are apt to do, a disease to

have an objective and independent existence, whose laws of operation will be invariable, instead of being an affection of each particular person's constitution and state of body, of which the results will vary with those variations and states of body. In this case she reasons rightly from a false premiss. Or else, she wishes to give a probable ground of hope or anxiety, as the case may be, in which case her reasoning is quite sound, as even a single instance affords a probability in regard to a similar one[4]. On the latter supposition her argument when drawn out is in the following form:—

My Lucy had just those symptoms.
They did not kill my Lucy.
∴ They will not necessarily kill your child.

Or more exactly:—

Symptoms that Lucy recovered from do not necessarily kill.
Your child's symptoms are those that Lucy recovered from.
∴ Your child's symptoms do not necessarily kill.

Her reasoning then is an indirect Enthymeme, both in the received sense of suppressing an essential member, and also in the Aristotelian sense of the word, as being a syllogism of mark and likelihood. The greater amount of dogmatic assurance with which she will foretell the result is connected with her general want of culture; the ignorant and uneducated being always more peremptory in their reasoning, and more apt to connect certitude with probability than the cultivated and learned.

[4] This, of course, will be an instance of reasoning from *the example*.

The really striking feature of the kind of reasoning to which Mr. Mill appeals is, the paucity of particulars which content the mind[5]. It is wonderful how few instances lead us to our conclusion. This is that too rapid mounting to universals, of which Bacon complained, and which led him to say that the human mind does not stand so much in need of wings as of weights. Its evil effects on science are obvious. But, in ordinary matters, it should be considered that all which we aim at is a probable conclusion. We are contented therefore with such an examination of particulars as is in our power, or as may suit our indolence or our rashness, and with the probability that such particulars represent the whole class, giving the same probability to our conclusion. And even a very few particulars render probable our universal major. Even three instances must ordinarily be accompanied with such diversities as give great force to their common element. It is in this way that the medical man comes to his hopeful or his desponding conclusion, and in this way that we ordinarily form our determinations in practical matters. But though a syllogism with precarious premisses can but give birth to a precarious conclusion, it is none the less a syllogism; and syllogisms I contend that Mr. Mill's instances are. As his opinion of them could not have been formed at all had they not been Enthymemes, I have thought this the place for examining it.

[5] However few they may be, it is nevertheless worth remarking how common speech bears witness to their equivalence in our thoughts to universality. We say, "everybody does," "nobody believes," and the like, on the strength perhaps of but three examples.

§ 9. THE EPICHEIREMA.

Were it not that this accident of uttered discourse receives separate notice in Logical works, I should not have thought it needful to give it such myself; for it is in truth no variation of the syllogism, either in inward form or outward expression. It is a syllogism with its reason attached, either to one or both of the premisses; or, as Aldrich defines it, a syllogism with an enthymematic sentence for a premiss. He gives the following example:—

No unjust man is to be loved.
Every tyrant since he is cruel is unjust.
∴ No tyrant is to be loved.

It is surely quite plain that we have here a syllogism altogether regular and ordinary, but with a fragment of alien matter adhering to it,—alien, I mean, to itself as a syllogism, however needful to the establishment of one of the premisses. It therefore requires no separate consideration, at least when presented in this shape. It may be, however, that *à fortiori* reasoning comes under the Epicheirema, of which something will be found in another place.

§ 10. THE SORITES.

More attention is due to the Sorites. In the modern use of the term, it denotes "a series of propositions in which the predicate of each is the subject of the next; the conclusion being formed of the first subject and the last predicate." Mansel, "Notes to Aldrich," p. 83[6]. The following may serve for example:—

[6] Aristotle (An. Pr. I. 23) justly regards it as a single syllogism, with a complex middle.

The prudent are temperate.
The temperate are self-possessed.
The self-possessed are full of resource.
The full of resource are fearless.
∴ The prudent are fearless.

A Sorites "may be expanded into a series of syllogisms in the first figure, the conclusion of each being the minor premiss of the next. There will be as many syllogisms as there are intermediate propositions between the first premiss and the conclusion; the first being the only minor premiss stated." Mansel, ibid. The second proposition in the series is the first major premiss, and the whole consists of enthymemes. Our example when expanded will run thus:—

The temperate are self-possessed.
The prudent are temperate.
∴ The prudent are self-possessed.

The self-possessed are full of resource.
The prudent are self-possessed.
∴ The prudent are full of resource.

The full of resource are fearless.
The prudent are full of resource.
∴ The prudent are fearless.

The Sorites may be either progressive, or retrogressive. Our example may be given in the reverse order to that in which we have presented it, as follows:—

The full of resource are fearless.
The self-possessed are full of resource.
The temperate are self-possessed.
The prudent are temperate.
∴ The prudent are fearless.

On experiment it will be found that a Sorites of this order can be expanded into syllogisms with less change of place in the propositions than the others; nor need we come on the subject, "the prudent," till the end.

The full of resource are fearless.
The self-possessed are full of resource.

Conclusion of 1st syllogism, and major of 2nd;

∴ The self-possessed are fearless.
The temperate are self-possessed.

Conclusion of 2nd syllogism, and major of 3rd:

∴ The temperate are fearless.
The prudent are temperate.
∴ The prudent are fearless.

As the *Sorites* can be exhibited under these two forms, so can it under both in the quantities of extension and comprehension. This the student can work out easily for himself.

It will now appear that Mr. Mansel's definition of Sorites is inadequate, being applicable only to the progressive Sorites in comprehension. In both the retrogressive Sorites in comprehension, and in the progressive in extension, we have "a series of propositions in which," *not* "the predicate of each is the subject of the next," but *vice versâ*, the subject of each is the predicate of the next. Hamilton's "Lectures," vol. iii. p. 379.

The name *Sorites* for this mode of reasoning is comparatively modern. Derived from Σωρός, a heap, and signifying a *heaper*, the word was anciently employed to denote the sophism called by Cicero *acervalis*, in which you are asked to determine whether the num-

ber of any thing be great or small. If only five, you say *small;* and are then asked will one more make it large? if not, will one more than that? and so on, till you are forced each time by a small addition to confess it to be large, and to acknowledge that the difference between small and large consists in something very small, say, the number one. "It is the last straw which breaks the horse's back," is a common example of Sorites in this the ancient sense of the word. It was also called the *calvus*, or bald, because when followed in the reverse order, you can puzzle the disputant as to how few hairs a man must have to be bald. Hamilton, iii. 376.

The name *Sorites*, in its modern sense has no very great propriety. The Germans denote the kind of argument before us by the far happier title, *Kettenschluss, a chain conclusion.* In fact, the Sorites is the form of that which we commonly speak of *as a chain of reasoning.* We rarely prove or disprove by means of a single syllogism, and even when the grand outline of an elaborate argument consists of one, the steps by which its premisses are proved involve much subordinate process, which will commonly be conducted in the chain form.

Now, while it is plain that a good Sorites is of necessary force, it is equally plain that it presents continual risk of fallacy, from the continual suppression of premisses and conclusions. This renders the reasoner liable to continual non-distribution and illicit process, as well as ambiguity of terms. The fallacies of which Sorites may be the channel are exemplified in the following instances, in one of which it is professedly proved that Themistocles' little boy governed the world; and in the other, by a Frenchman, that he

was himself the most beautiful thing in the world. The first, which is well known, is as follows:—

My little boy governs his mother.
His mother governs me.
I govern the Athenians.
The Athenians govern the world.
∴ My little boy governs the world.

The second, that by the Frenchman, runs thus:—

Europe is the most beautiful quarter of the world.
France is the most beautiful country in Europe.
Paris is the most beautiful thing in France.
The College of Beauvais is the most beautiful thing in Paris.
My chambers are the most beautiful things in the college.
I am the most beautiful thing in my chambers.
∴ I am the most beautiful thing in the world.

Now in both these we have obvious ambiguity of terms at every step. But it must be considered that a single case of this will vitiate a whole Sorites; and that, while every one can both detect and avoid such a series of them as appears in these two examples, it requires much care and attention to do the like in a protracted chain of reasoning, not exhibited in naked propositions, but enveloped in rhetoric and illustration, and in which, not the exact propositions which constitute the syllogisms, but seeming equivalents for them, are often employed.

Here, then, let me call to mind what I have already laid down. Reasoning is commonly thought to be difficult, and within the power of but few. But if we mean by reasoning its abstract form, the syllogism, so far from being difficult, it is spontaneous,

necessary, performed by an involuntary flash of the mind. What is difficult, is to give the care and attention requisite either for producing or following a chain of reasoning, to force ourselves down to accuracy of definition, and adequacy of division, to guard against subsequent deviation from either, to watch throughout the force and the distribution of terms, and to keep all this distinct amid rhetoric, illustration, digression, and the passion of polemical zeal. Comparatively few indeed have habitually exercised themselves in these habits in any matter, and of those few some have learned and practise them in some matters, without applying them to others, in which latter they are as loose and inaccurate as the majority of mankind. Thus the practised lawyer often argues foolishly and inconsequently on topics of Theology or Philosophy, and even the mathematician frequently leaves his accuracy behind him when he leaves his peculiar science.

Perhaps "Edwards on the Will" may be taken as the greatest example of fallacy in a connected chain of reasoning, a chain so seemingly close that many have regarded it as infrangible.

II. DIVERSITIES ARISING FROM THE NATURE OF PROPOSITIONS.

We have seen that propositions have various characteristics besides the grand division into reciprocal and attributive, on which is grounded the distinction between the unfigured and the figured syllogism. There is, also, it must be remembered, the distinction between the categorical and the conditional proposition, which brings out proportionate distinctions between the syllogisms in which they occur. I say *proportionate*

distinctions. They who believe that these different classes of propositions belong to essentially different forms of thought, must believe the same of the different aspects of syllogism to which they give birth. They, on the other hand, who believe that the difference in the propositions is but superficial and accidental, will believe no more of the syllogisms. I say this of conditional and hypothetical propositions and syllogisms; for there are other differences which in my view are far more important.

§ 11. HYPOTHETICAL SYLLOGISMS.

Conditional syllogisms are divided like conditional propositions into hypothetical and disjunctive, by those at least who view the conditional as the genus, and these two as the species contained under it. Aldrich adopts a quite different division, with which as rejecting it we need not trouble ourselves; and I have made a different one still in the case of propositions, which I propose now to follow. I begin then with the hypothetical syllogism, which Aldrich defines as follows:—"Est in quo una, duæ, vel tres propositiones sunt hypotheticæ." Of the first case he gives this example:—"Si sapit, est beatus; sapit, ∴ est beatus." And something equivalent is so generally presented to us, and by such high authorities, that one ought to be shy of quarrelling with it. Nevertheless, I must express my conviction that such examples are not syllogisms at all, nor the utterances of any discursive act whatever. If I am right in viewing such an hypothetical proposition as the seeming major in Aldrich's instance as no more than a categorical one presented as matter of doubt, the

connexion between subject and premiss being asserted, but the real existence of the subject (in this case the wisdom of the person spoken of) left in question, this will appear at once. What we are presented with is a categorical proposition, the existence of the subject not being certainly affirmed. But the uncertainty is removed, therefore the categorical proposition stands. At first it was, *si sapit, beatus est.* But we find that we need not trouble ourselves with *si*, and therefore we say, *sapit, ergo beatus est.* So in the instance given by Mr. Morell:—"If Cæsar aimed at a crown, he deserved to be slain. But he did aim at a crown, ∴ he deserved to be slain." The two last propositions, the seeming minor and the seeming conclusion, are but the re-utterance of the first, the particle indicating uncertainty being removed. And that uncertainty, whether real for a time in the mind of an inquirer, or put on for the purpose of argument, belongs, I contend, to the matter, not to the form, of the thought. There is, therefore, here no progress from two judgments to a third; there is but one judgment, viewed as unsubstantiated at first, and substantiated afterwards.

Similarly and more obviously, if we made the second proposition (not a minor) negative. *If Cæsar aimed at a crown, he deserved to be slain. But he did not aim at a crown, ∴ he did not deserve to be slain.* Here we *feel* that we have no valid inference. We have simply in the second proposition contradicted one member of the first, and no conclusion is or can be arrived at, inasmuch as Cæsar might not have aimed at a crown, and yet deserve to be slain. By denying, however, the consequent of the major, we do get inference, but only, I contend, immediate inference, a

verstandesschluss. If Cæsar aimed at a crown, he deserved to be slain; but he did not deserve to be slain, ∴ he did not aim at a crown. This is a case of inference by contradiction. It is manifest that if I deny the reality of either subject or predicate, I set aside the proposition to which they belong.

That we have here no separate form of thought from the categorical will appear from this, that the same thing can be done with any categorical proposition: e.g. The centaur is a union of the head, breast, and back of a man, with the trunk and legs of a horse. You may say, "There is no such union as that," and, therefore, my proposition is contradicted; and if there be no other notion of a centaur than that, there are no centaurs. Of course this could be argued syllogistically, but we have arrived at the conclusion in the present case by immediate inference.

Let us try another form:—

The D's are E.
If the A's be B, the C's are D.
∴ If the A's be B, the C's are E.

Here we have a real syllogism; but I contend that it consists solely in the categorical propositions—

the D's are E,
the C's are D,
∴ the C's are E,

the condition of the C's being D is what requires to be proved, a feature belonging to the matter, not the form, of the thought.

Once more,

If the A's are B, the C's are D.
If the E's be F, the A's are B.
∴ If the E's be F, the C's are D.

Here, too, we have a perfect syllogism, and a syllogism unlike the last, consisting altogether of the hypothetical elements of the thought, but whether it constitutes an essentially different form from the categorical will depend entirely on the view we take of hypothetical propositions. If we regard these as essentially different from categorical, of course we must regard the syllogism in question as essentially different from the categorical also. As I have maintained the identity of hypothetical and categorical propositions, I must maintain the like of this really hypothetical and the categorical syllogism. Its categorical statement is as follows:—

The cases if any in which the A's are B, come under the cases if any in which the C's are D.
The cases if any in which the E's are F, come under the cases if any in which the A's are B.
∴ The cases if any in which the E's are F, come under the cases if any in which the A's are B.

That the whole is hypothetical is obvious on the face of the syllogism, but this is no more than to say that it is a syllogism which turns on the relation of suppositions to each other, a relation the same in kind with that of any other terms.

§ 12. THE DISJUNCTIVE SYLLOGISM.

This is a syllogism in which the premisses consist of disjunctive propositions, e. g. the first affirmative, the second negative as regards at least its terms.

A is either B, C, or D.
A is neither B nor C.
∴ A is D.

The crucial instance in the second book of the *Novum Organum* is a syllogism of this kind.

In its natural statement it is difficult to exhibit it in the regular categorical form. But by stating the major hypothetically, we overcome the difficulty as follows:—

If A be neither B nor C, it is D.
A is neither B nor C.
∴ A is D.

In many cases even this is needless; for example:—

The season is either spring, summer, autumn, or winter.
The season is neither spring, summer, nor autumn.
∴ It is winter.

This will give us a simple categorical syllogism, with a disjunctive middle term:—

The season which is neither spring, summer, nor autumn, is winter.
This season is neither spring, summer, nor autumn.
∴ This season is winter[7].

[7] There is an objection to these exhibitions of disjunctive reasoning in pure form, that though equi-pollent, they do not present the very thought. And that very thought I am persuaded is not really discursive, and therefore not really syllogistic. My denial of this is grounded on the same considerations as my denial of the syllogistic character to many hypothetical so-called syllogisms. In a disjunction several propositions are suggested, one of which we know *aliunde* must be true. We are supposed to examine them one by one, and reject each, except the true one. Now I cannot see any thing discursive in the mere act of refusing to admit a suggested proposition, or a series of such. But this is all which the mind does in disjunctive inference. The matter is every thing; that the alternative lies between a limited number of propositions, that all of these are false but one, and that, conse-

This is called an exhaustive reasoning, and it is of the most practical use in investigation, as may be seen by consulting the part of the *Novum Organum* which treats of it.

The alleged fact that a dog, having missed his master at a place where four roads meet, will put his nose to the ground in three of the directions to catch the scent, and failing, will make no such attempt in the fourth, but straightway set off in it, would seem to infer his capacity of a disjunctive syllogism. I do not know who has ever had an opportunity of ascertaining that he acts thus, and even if the fact be established, we cannot know whether he does so by reasoning, or catches the scent at once in the fourth direction.

Although, however, this reasoning be in its essence categorical, it contains two peculiarities, which cannot easily be explained away.

1st. The disjunctive proposition with which we start gives us more than one major premiss *in posse.* Till we examine the facts, we do not know which of the members of the disjunction are to be discarded, and which to remain. If, to take our second example, the season be winter, then the major and the rest of the syllogism will be as in that example. If any of the others, then winter will come into the major, and that one of the others will be affirmed, and so through the choice offered.

2nd. The syllogism lies apparently out of the common categorical form, inasmuch as we seem to have a negative minor, and yet an affirmative conclusion.

quently, that one is true, are all questions to be answered by inquiry into facts.

But I think the minor (this season is neither spring, summer, nor autumn) may come under the case considered (Part I. p. 53), in which the sign of negation, the *minus*, is within the term, whose relation to the subject is left positive; and if this be granted, the proposition is really affirmative, and the whole syllogism appears as an ordinary one in *Barbara*.

§ 13. THE DILEMMA.

Two almost distinct things have been designated by this name, the one a seeming form of syllogism, the other not.

First, the real logical Dilemma, or hypothetico-disjunctive syllogism, consists, as the latter title imports, of a combination of hypothetical and disjunctive elements. Its form is as follows:—

If either A is B, or C is D, E is F.
But either A is B, or C is D.
∴ E is F.

It is easy to see that we have here but an example of that which is generally, but, as I have maintained, erroneously, supposed to be an hypothetical syllogism, modified in aspect by a complex disjunction; and if I am right in excluding that example from the rank of syllogism, the exclusion of the Dilemma will follow also. It is then a case of immediate inference,—in the negative, of inference by contradiction. It is called the *cornutus*, or horned syllogism, from the double presentation of terms in the disjunction, and it has been well described in its negative form in the following words: "In the sumption, the disjunctive members of the consequent[8] are opposed like horns to

[8] In Hamilton's example, the disjunction is in the consequent.

the assertion of the adversary: with these we throw it from one side to the other in the subsumption, in order to toss it altogether away in the conclusion." Hamilton, "Logic," vol. iii. p. 352.

Though we commonly speak of a *Dilemma*, and illustrate it by examples of disjunctions into two, these may plainly consist of any number of members; and it has been proposed to speak of a *trilemma* or *tricornis*, a *tetralemma* or *quadricornis*, a *pentalemma* or *quinquecornis*; also of a *polylemma* or *multicornis*.

Although I am convinced that the *dilemma* (to return to ordinary terminology) is not a syllogism, I nevertheless regard it as an important form of inference, and of great practical use. This it has from its union of the hypothetical with the disjunctive character, giving us security against overlooking possibilities. It comes out strongly in medical conclusions. For example, a particular malady produces one sort of known symptoms; or, in the absence of that, necessarily another. If both be absent, we have the strongest grounds for pronouncing that the malady cannot exist.

The Dilemma has been confounded, and that in re-received Logical Treatises, with a variety, not of reasoning, but of method of disputation,—that of forcing on the adversary two or more conclusions, neither or none of which he can accept, and so compelling him to abandon his position. This is what is commonly meant by *impaling him on the horns of a dilemma*, and it is to the association with inconvenience and discomfort hereby created that I suppose we owe the conversational use of the word dilemma, as denoting any perplexing situation. But with the inconvenience of an adversary, or with an adversary at all, pure logic has nothing to do. The forms of judgment and inference, even when confined

to the single judging and inferring mind, are its sole concern; and a Dilemma proper is as serviceable in solitary inquiry as it can be in disputation[9]. Moreover, though in disputation the adversary's part and the propounder's can be combined into a Dilemma, and give birth to inference, the mere reluctance of the former to admit either of two alternatives is in itself no inference at all.

More etymolygies than one have been proposed for the word *dilemma;* but the most probable is that of λῆμμα, a sumption or proposition; seeing that we have in it *a double sumption.*

The name "Dilemma" has been also given to the well-known sophism called sometimes the *Cornutus*, at others the *Litigiosus*, the *Crocodilinus*, and by several names besides. The essence of this is to infer impossibility of either alternative in a disputed point. His master received the half of the sum due to him from his pupil for instructions in pleading, and engaged to wait for the remaining half till the latter should have won his first cause. This the pupil showed no haste to do; whereupon the master, losing patience, sued him for the sum, and the other appeared in court to defend himself in person. "Oh! foolish youth," said the master, before the trial commenced, "dost thou not see that in any event thou must lose? If the decision be in my favour, I have gained my cause, and thou must pay; if in thine, thou shalt have won thy first cause, and by the terms of our agreement, must pay." "Oh! wisest of masters," re-

[9] Nay, startling as the assertion may be to those who are only acquainted with the conversational use of the word, *Dilemma*, there are few things which the inquirer will welcome more than one fairly established.

joined the pupil, "dost thou not see that in any event thou must lose? If the court decides for me, I need not pay; if against me, I shall not yet have won a suit, and, by the terms of our agreement, am still free." The judges are said to have peevishly dismissed the case; calling it *κακοῦ κόρακος κακὸν ᾠόν*, the bad egg of a bad crow, alluding to the plaintiff's name, Corax; and the phrase passed into a proverb. Hamilton, iii. 468.

There are many examples of this sophism. Perhaps the most amusing is that in Don Quixote, of the bridge and his gallows, which was proposed to Sancho during his government of Barataria. In themselves they are but sophisms, and mere playing with thought; but, in order to account for the notice which they obtained from the ancients, we must remember, as has been justly urged, that, with them, thought was in its childhood, and had to be exercised, and that mainly by oral means,—by conversation and disputation.

Such puzzles, however, may present themselves in grave inquiry. For example, the same mind may be led to take a high view of the authority of the Church and that of the State. The result will be at first similar to the instances which we have just had before us. In such cases we must conclude that we are using what seems the same term in different senses.

§ 14. THE DEFINITIVE SYLLOGISM.

In this we predicate something of the definition of a term, which of course we are thereby enabled to predicate of the term itself; e.g.—

The combination of looking forward and of pleasure must give birth to courage.

But hope is the combination of looking forward and of pleasure.

∴ Hope gives courage.

This is a plain unfigured syllogism, which demands no consideration. It is, however, a most important method of reasoning. To be sure of a definition, and then to consider it attentively, is one of the best means of throwing light on the thing defined; and is, I need not say, an habitual mode of reasoning in the Platonic dialogues and in Euclid. The mode would, I suppose, come under the head of Mr. Broun's *traductive*, as distinguished alike from deductive and inductive reasoning.

§ 15. THE INDUCTIVE SYLLOGISM.

The term *Induction* has been often used in opposition to syllogism; always, so far as I have observed, by Bacon, and sometimes, though not always, by Aristotle. This diversity has its origin in sometimes looking only at the materials of reasoning, and sometimes at the reasoning itself. When he does the latter, Aristotle justly views Induction as a form of syllogism.

It consists in premisses, of which one is a conjunctive proposition, and the other an inductive one: the members forming the conjunction being the same as those which are used in the induction, and constituting the middle term[1]; e. g.—

[1] This is a different account of the procedure from Aristotle's, who defines induction as "proving one extreme of the middle by means of the other."—An. Pr. II., xxiii. But by the *middle*, he means that member of the reasoning which is, or seems, intermediate in extension, not that which is the medium of comparison.

x, y, z are A., *i. e.* x, y, and z have each the mark A.

x, y, z are the whole B; *i. e.* constitute the class B.
∴ B is A.

This is obviously a syllogism; the mark A and the class B being compared with the middle x, y, z. It differs from deductive reasoning, in inferring *of* a class, instead of inferring *from* one, leading us *to* an universal, instead of *from* one. And this is all that needs be said of it from a purely logical point of view. This is the form of inductive reasoning[2].

With this consideration Bacon had no occasion to trouble himself. He was occupied, not with the essential validity of induction, but with the conditions on which it could be satisfactorily applied to discovery; and of that he proposed one great end to find the true form, the *differentia vera*, the *fons emanationis*, of any given nature. Hence he discusses not merely the requisite number, but the character and the variations of instances; and his well-known tables of *Comparentiæ*, and the subsequent inquiry into the *prærogatives of Instances* are the central part of his system. While therefore his method is continually supposed to be a counter one to that of the Aristotelian Logic, and while his title to the work which most fully expounds that method, as well as his habitual language, gives countenance to the supposition, the two do not come for one moment in contact. The one, as Sir W. Hamilton has somewhere observed, is occupied with the mental

[2] St. Paul's reasoning in the opening of the Epistle to the Romans is a case, though a very simple one, of induction. It is as follows:—Gentiles are sinners. Jews are sinners. Jews and Gentiles constitute all mankind. ∴ All mankind are sinners.

conditions of knowing, the other with the conditions under which things make themselves scientifically known. Indeed, I do not remember that Bacon ever dwells on the process of induction viewed in itself.

Putting aside his especial aim of arriving at the true form of a given nature, and viewing induction as an instrument of discovery, it is obvious that the two great problems are, to ascertain the presence of a given mark in several things, x, y, z, and then to gain warrantable grounds for believing that those several things do indeed constitute the whole class about which we inquire. The first is concerned simply with the accuracy of observation and experience; the second, and by much the more difficult, can seldom if ever be more than approximately solved. The method proposed in the second book of the *Novum Organum* is indeed the true one; but it is comparatively seldom that it is fully carried out; and for an absolute determination that our enumeration is sufficient,—that x, y, z are indeed the whole class,—no unvarying or infallible rule can be given.

But with all this pure Logic has nothing to do. The syllogism we have given would be as much induction, if we so intuitively knew that x, y, z are the whole of B, that we had no occasion to bestow a single thought on the question, as if we had to search for grounds of the conviction.

Whilst we are merely engaged with this base form of Induction, this *inductio per simplicem enumerationem*, we are at a considerable distance, as has been intimated, from what is called the Baconian Philosophy. In truth, though there may be a general supremacy of Induction in that Philosophy, many of its methods and processes will be found when viewed as reasoning to

be in themselves deductive; and Professor Dr. Morgan truly remarks that "what is now called induction, meaning the discovery of laws from instances, and higher laws from lower ones, is beyond the province of formal logic. Its instruments are induction properly so called, separation of apparently related, but really distinct particulars—mathematical deduction, ordinary logic, &c. It is the use of the whole box of tools." *Dr. Morgan, Formal Logic*, pp. 215, 216.

The superiority of induction as an instrument of discovery to mere deduction, is abundantly obvious. Even without reference to the phenomena of the external world, it is clear, as has been already been pointed out, on consideration of the bare form of thought, that universals are more rarely attainable by the common modes of inference than particulars. Thus, the table of opposition shows us that E can only be proved by the refutation of both A and I, and is not proved by the refutation of both E and O, and is not proved by the establishment of O; and that A can only be proved by the refutation of both E and O, and is not proved by the establishment of I; while I is only disproved by the establishment of E, and O only by the establishment of A.

When we turn to the ordinary division of syllogism, the case is still stronger. E is only proved once in the first figure, *Celarent;* once in the fourth, *Camenes*, and twice in the second, *Cesare* and *Camestres;* and A only in *Barbara*. That is, out of nineteen forms of syllogism, only four will prove an universal negative, and only one an universal affirmative. In the affirmative Table in Sir W. Hamilton's "System of Notation," we have but three universal conclusions out of

twelve forms in the first figure, and but four out of twelve in the second and third.

If, leaving the abstract form of thought, we turn to outward phenomena, we there find in the first instance no universals. Of course there can be none until those phenomena have been observed, registered, and classified. And how cautious we should be of anticipating the fullest carrying out of those processes, how anxiously we should be on our guard against premature universals, no tongue has preached so earnestly and powerfully as that of Bacon.

It is plain, then, that the process of reasoning, whereby we legitimately arrive at an universal, must have many advantages over that by which we deduce from one. But Bacon, though admitting in his scheme a place for deduction, is hardly aware how much science gains from the combination of the two forms of reasoning. When we have really arrived at an universal, it would be of little use to us, unless we could infer from it; and accordingly those sciences, such as astronomy and optics, in which induction and deduction go hand in hand, are in the most advanced and ripened condition. But Bacon, in laying down the conditions of scientific discovery, was not aware of the prodigious engine which succeeding generations were to find in mathematics, and therefore deduction does not occupy its true place, or have justice done to its importance, in his scheme.

§ 16. ULTRA-TOTAL DISTRIBUTION OF THE MIDDLE.

This form of reasoning has lately received some attention in high quarters. A few years ago Professor

De Morgan proposed to Sir W. Hamilton some such syllogism as the following:—

Most men have coats.
Most men have waistcoats.
∴ Some men have both coats and waistcoats.

Or, to give it the proper shape of syllogism—

Most men are coated.
Most men are waistcoated.
∴ Some waistcoated are coated.

This was accepted by Sir W. Hamilton as valid inference, though, as he says, of little use. I am not sure that he is right in thus disparaging it, and the validity cannot be questioned. It is also admitted by Abp. Thomson, who speaks of it as "a possible mode, and as one more proof of the incompleteness of the doctrine of the syllogism as commonly taught."—"Outline of the Laws of Thought," 4to edit. p. 162. Sir W. Hamilton provides for it his two quantities additional to those usually received, the *semi-definite*, or *half*, and the *indefinite-definite*, or *most*, which he notes as U, Y, and U I, Y O.

Are these quantities really admissible in pure Logic? And are the reasonings founded on them to be classed *in themselves* as syllogisms? I say, *in themselves*, for being valid reasonings, they must of course be based on syllogism. It will be observed that the force of inference in the example given depends on what is called the ultra-total distribution of the middle between the two premisses, for *most* and *most* are more than all; and therefore if we confined the two predicates each to the proposition in which it occurs, we should be landed in an absurdity. We are forced therefore to hold that they are both applicable to some of the

two subjects. Now, in so doing, we so far bring ourselves within the range of Logic proper, that we make our inference by means of a peculiar condition of our middle term. But, on the other hand, do we arrive at that inference otherwise than by means of a thought not expressed in the terms? We have to bring before our minds the consideration that *most* and *most*, if altogether separated, would be more than all, and therefore cannot be altogether separated. Now this consideration, as I have intimated, is not presented in the terms. Is it not better, therefore, to make of it a premiss? We shall thus bring out the whole case in two syllogisms.

1st. *Most and most* (or *a half and most*) cannot have two altogether separate predicates, without making more than all. But more than all is an absurdity. Therefore, to separate altogether two predicates of *most and most* is an absurdity.

2nd. To separate altogether two predicates of *most and most* is an absurdity. To be coated and to be waistcoated are predicates of *most and most*. Therefore, to separate altogether being coated and being waistcoated would be an absurdity.

Or, gaining greater simplicity, we may infer from our first syllogism that—

Where two predicates apply each to most and most (or to a half and most) of the same matter, they both apply to some of that matter.

To be coated and to be waistcoated apply to most and most of that same matter, *men*.

∴ They both apply to some of that matter.

We thus free the logical scheme from an anomalous form, and, what is of more consequence, we more truly express our thought when we reason on such matter.

Of course, having done this, we need not continually give formal utterance to the whole, but may argue in the shape presented at first.

In this view, that first shape is an Enthymeme, of which the two sentences, *most men are coated*, and *most men are waistcoated*, are, taken together, the minor, and the major "where two predicates," &c., is suppressed.

The same kind of reasoning applies to the lesser as opposed to the greater, *most*. With more foundation, in fact, we can argue that since

Not half of men are coated,
and Not half of men are waistcoated,
∴ Some men are neither coated nor waistcoated;

and a suppressed major corresponding to that of the former can be stated at once on demand.

§ 17. A FORTIORI REASONING.

This is difficult at first to reduce to the form of syllogism, a difficulty which is thus livelily illustrated by Dr. Latham (Logic, p. 143), and which he seems to give up as insoluble.

Dialogue.

"*Examiner*.—What is the predicate in the major proposition of this syllogism?

Elephants are stronger than horses.
Horses are stronger than men.
∴ Elephants are stronger than men.

"*Hasty Student* (at once).—Horses.

"*Cautious Student* (after a pause).—Stronger than horses.

"*Examiner*.—The latter answer is the right,the

former the wrong one. *Horses* is the subject of the minor, *stronger than horses* the predicate of the major proposition. What follows from this?

"*Hasty Student.*—That the conclusion is true.

"*Cautious Student.*—That there is no middle term.

"*Examiner.*—As a matter of fact each answer is correct. The latter, however, is correct as a point of Logic. In syllogisms like the one in question, *there is no middle term.*

"*Students.*—Is it right, then, to call such combinations as the one in question, syllogisms?

"*Examiner.*—We can scarcely deny them the name."

"Neither can we," subjoins Dr. Latham, and he has Professor De Morgan to back him, both of them viewing the syllogism in question which represents *à fortiori* reasoning as one without a middle term.

Now suppose we carry on the imaginary dialogue. It might take the following course:—

The two Students.—But how can there be a syllogism without a middle term, in the sense of a medium of comparison?

Examiner.—*Solvitur ambulando.* We seem to have one here.

Third Student (cautious, but sanguine).—I do not think so.

Examiner.—Then show us the middle.

Third Student, &c.—May I substitute for *horses are stronger than men, the strength of horses is greater than that of men;* and for *elephants are stronger than horses, the strength of elephants is greater than that of horses?*

Omnes.—Certainly.

Third Student.—Then I maintain that *the strength of horses* is the middle term.

Omnes.—How so?

Third Student.—After saying that the strength of horses is greater than that of men, all that is wanted to prove the strength of elephants or of any thing else to be greater than that of men, is to prove that it is the same as, equal, or equivalent to that of horses, and I affirm this in affirming it to be greater. The *vis consequentiæ* of *à fortiori* reasoning consists in the abundant proof of the middle. It may therefore be viewed as an Epicheirema—a syllogism with the proof of one of the members appended. The syllogism before us runs thus:—

The strength of horses is greater than that of men.

The strength of elephants is equivalent to that of horses (because it is greater).

∴ The strength of elephants is greater than that of men.

This seems to me a more complete expression of the actual discursive thought in *à fortiori* reasoning than is furnished by Dean Mansel's resource of supplying a major premiss. "Whatever is greater than a greater than C, &c."—*Mansel's Aldrich, Appendix*, p. 200. No doubt this gives valid syllogism, but one different I contend from that present to the mind in the cases in question.

In my view it is not in the excess of the strength of elephants over that of horses taken by itself that the *vis consequentiæ* resides, but in the assurance which that gives us that the strength of horses is there.

The same holds good with the descending comparison:—

The strength of horses is less than that of elephants.

The strength of men is less than the strength of horses.
∴ The strength of men is less than the strength of elephants.

Here as much as in the former case *the strength of horses* is the middle term, but the expression of this in exact syllogistic form is not so easy as in that, because to assert the equivalency of the strength of men to that of horses on the ground of its being less has a startling effect. Such equivalency, however, for the purposes of the reasoning is here asserted.

We have now completed our review of the various aspects in which syllogism can present itself, and have come to the conclusion that amid them all, it is always the same simple process of comparing two propositions by means of a term common to both, and so arriving at a third, or to define it more simply, of comparing two terms with each other, by comparing each of them with a third. But while we are forced when analyzing it to speak of it as a process, we must ever remember what has been already insisted on, that it is not always a conscious process, but often an immediate flash of thought, as rapid and spontaneous as the concepts and judgments of which it is composed; and that those concepts and judgments are themselves very frequently capable of being resolved into syllogisms.

As we use notation for the purpose of exhibiting terms and propositions in general formulæ, so various schemes have been proposed for doing the like with syllogisms. Euler gives diagrams, consisting of circles standing apart, to denote complete exclusion or negation; placed one within the other, to denote complete

inherence or universal affirmation; and intersecting each other, to denote particular affirmation or particular negation. He was not, however, the first that did this. The merits of those diagrams consist in lively and visual clearness, and the defeat of the whole scheme in its being necessarily confined to extensive reasoning. At least it would not be easy to realize the comprehensive form by means of it.

Sir W. Hamilton has given the forms of all possible syllogism by means of a notation simple and complete, and capable of being read off in extension or in comprehension at pleasure. Euler's scheme, and a different one by Lambert, will be found in Abp. Thomson's "Outline of the Laws of Thought," as well as Hamilton's, which may also be seen in Hamilton's "Lectures," and in Baynes's "New Analytic of Logical Forms." We need not swell our pages by presenting them here; suffice it to say that the scheme, which is exhaustive, gives thirty-six valid moods, of which twelve are affirmative in each of the three useful figures, the fourth, as we have already seen, being of no value.

The late distinguished Professor Boole has exhibited logic[illegible] in Algebraic form, in [illegible] remark-able [illegible] of the L[illegible] ought," of [illegible] the[illegible] alge-b[illegible] Pr[illegible] Morgan [illegible] gic."

[illegible] with pure or [illegible] is a large and [illegible] conclusion of [illegible] valuable observa-

tions I refer my reader. I must content myself with a very few and inadequate remarks. Pure Logic, as we have seen throughout, is concerned with the form, and not at all with the matter, of thought. For this reason no account has been taken in these pages of what is called *Modality*. The *Modes* from Aristotle downwards have been ranged under these four heads: the Necessary, the Impossible, the Possible, and the Contingent. As the *Impossible* is but the negative side of the Necessary, and the Contingent but the realization of the Possible, it is sufficient to divide the matter of Thought into the Necessary and the Contingent. Now by such distinction of matter, pure Logic is unaffected. A concept, when brought under logical inspection, presents the same phenomena, and is subjected to the same classification, whatever that may be of which it is the concept. A judgment contains the same elements on whatever it may be passed. And a syllogism follows the same course, and evolves itself by the same process, on whatever matter that course may be taken and that process carried out. The premisses may state necessary truths, or they may state contingent, but if the requisite conditions of syllogism be fulfilled, the conclusion follows from them with as adamantine a necessity *in relation to them* in the one case as the other.

In practice, however, the difference of Modality modifies the logical process. In dealing with contingent[3] and not necessary matter, i. e. with that which is not true or false, in such a way as would involve absurdity in supposing it otherwise, but only happens to be true or happens to be false, we may indeed from contingent

[3] I here use the word contingent in its modern sense, which scarcely answers to the ἐνδεχόμενον of Aristotle.

premisses construct necessary arguments, but we cannot always or generally succeed in doing so; and the cases in which we cannot comprise the greater part of the practical concerns of life, as well as much scientific inquiry. Hence arises the *Enthymeme* in the sense wherein Aristotle employs the term, different, as has already been remarked, from that of subsequent logicians. He defines it as a syllogism from probable propositions, or signs. The latter may be probable or necessary. The subject has no relation to the form of syllogism[4]. In this way we reason in courts of justice from indications. "The murderer," to borrow an example from Abp. Thomson, "must have been near at the time; the prisoner was near at the time; ∴ he was the murderer." Here we have no valid syllogism, unless we can prove that no one else was near. But we have a mark of likelihood, taking us a certain way on our road, and a combination of such marks, none of which are conclusive by themselves, will often produce practical conviction. It is, as I have said, by arguments of this sort, that we direct our course in the affairs of life, and our right to do so in given cases does not admit of being exactly laid down by rule or method, but must depend on the indefinable force of combined considerations, and the vigour and soundness of the mind which entertains them.

In the material sciences we must similarly avail ourselves of applied Logic for the purpose of discovery. But in them we have a much larger field of observation than in practical concerns, a much more manifold combination of facts, ampler means and more subtle

[4] In the first edition the *Enthymeme* was stated to be defined by Aristotle as "a probable syllogism from signs or marks of likelihood." This was quite wrong.

methods of registering phenomena, and a far greater power of comparing our observations with those of others. The processes whereby all this is effected may be seen in the second book of the "Novum Organum," where the subject is admirably illustrated by the inquiry into the nature of heat, in which the results of Tyndall are so wonderfully anticipated by Bacon. Sir J. Herschel's little book of "Natural Philosophy" exemplifies the Baconian method by a beautiful exposition of the cause of Dew. Whewell's "History of the Inductive Sciences," and the concluding part of Abp. Thomson's "Outline of the Laws of Thought," may be consulted with advantage here.

The argument from Analogy comes under the head of applied Logic,—an argument which is of all others the most fascinating and the most perilous, but which when well guarded is also one of the most useful. Its perils are obvious at a glance, although few are able practically to surmount them. They are two-fold. 1st. The turning a metaphor into an analogy. No doubt a metaphor is a short analogy, but one which has no purpose beyond itself. It is merely a pictorial instead of a direct statement of thought; and we abuse it if we reason from it. 2ndly. Reasoning beyond the analogy. It is of the very nature of one, that the things which are analogous should correspond in so far as they are so, and differ in other respects. Now when our minds are full of the correspondence they are apt to overlook the difference. It is a true analogy to individual life which we present when we speak of the childhood, the youth, and the manhood of nations. But if we go on to predict for every nation an old age, a decrepitude, and a dissolution, we are, as Burke pointed out, transgressing the bounds of the analogy.

We do not know that nations, while they resemble individuals in the law of their growth, resemble them also in being mortal, in having an organization and strength purposely bounded in time. On the contrary, though we have seen decay and dissolution come on many of them, we have good ground for believing that a nation may retain the elements of morality and religion, in which its life consists, and so go on vigorous and great till the end of the world.

Of the real use of Analogy, I have not space to treat in this place. It has great negative value, i. e. great power of repelling objections, as may be seen by referring to Bp. Butler's immortal work. But it is also, as may be seen there as well, largely capable of positive suggestion.

Applied Logic, then, may be considered as such modification of the science as brings it to bear on the mixed and contingent matter of which real life is composed. The pure science is too finely edged a weapon for such matter, which we must condescend to cut with an instrument similarly shaped, but coarser and blunter.

But if the concerns of real life lie below the severity and perfection of pure Logic, there are on the other hand matters which are far above it. All that is ideal, all that belongs to the super-sensuous, all that is Heavenly and Divine, transcends the science which has formal thought alone for its object, and human language the exponent of that thought for its organ. The mind's eye takes in realities which are above the grasp of the conceptive faculty, and beyond the bounds of logical definition, and we must always remember that neither our knowledge nor our perception of those realities entitle us to attempt measuring them by in-

struments so altogether inadequate. To this class, it needs scarcely be said, belong the great truths of theology, a class of truths to which Logic has been applied more perhaps than to any other, while the danger of doing so is greater as regards them than in the case of any other. If we venture to think and speak of those truths at all, we must ever remember that we think most inadequately and fragmentarily, and speak by means of an imperfect instrument, whose utterance can, at its best, be but approximately true; that we think and speak as those who see through a glass darkly, and know but in part and prophesy but in part.

This is unquestionable; but we cannot, because we see and admit it, hinder the logical faculty from exercising itself on theology more than on any other matter which is forcibly and habitually present to our minds. As easily might we command the heart to be still and the blood to be stationary whilst we continue living mortals, as bid the mind not conceive the objects set before it, the judgment be silent on them, or the discursive faculty be at rest regarding them. If Divine Truth is to be any thing real and practical to us, if thought is to be interchanged on it, if it is to be explained, vindicated or taught at all, then protest against them as we like, logical statements will make their appearance, and a logical theology will thrust itself forward.

What then is the part of those who at once believe in revealed truth, and feel the inadequacy of all mortal statement, and, therefore, of every logical proposition, and every logical operation to represent that truth? This is one of the most momentous questions set before the thinker of the present day. There is an

obviously strong tendency to slight the whole of dogmatic divinity on the ground of its being logical. But they who tend in this direction are bound to tell us what to do with the logical element of our being, and its necessary exertion of itself. That element is so large, and its operation so unavoidable, that truths which are to come into no relation with it, would seem destined to have but a faint hold of the minds to which they are addressed.

Though the task is foreign to the general purpose of this little compendium, I think it worth while to throw out a few hints for the guidance of such as may be sensible of the practical difficulty which besets us here.

First, we are under an absolute necessity of forming judgments, and expressing them by propositions, on any matter with which we are greatly occupied. But if the concepts and terms which compose those judgments and propositions be felt to be most inadequate, we may keep such inadequacy in mind, even while we retain and value them; we may regard the propositions of which they are the elements as true, though inadequate; true, but truth in perspective; true, but incapable of measuring our intuition, far less the object of that intuition.

In this case, we may learn to content ourselves with propositions which seem irreconcilable, but each of which expresses to us a truth that we could not easily seize and detain without it. Seeing that the realities thus sought to be denoted transcend all conception, and all human utterance, they can be no more than approximately stated, and therefore the seeming discord of two different statements is no valid objection to either, so long as this character of mere approximate truth be kept in mind regarding both.

And as we cannot do without propositions, we may find security in contenting ourselves so far as we can with such as seem absolutely necessary for setting forth the central truths of revelation, and have been adopted, not by one set of men, or one school, or one community, but by the collective Church. This is, I think, a very important light in which to view the Divinity of the Creeds. It is the result of the irrepressible logical faculty; but the logical faculty, not of individuals, but of the Church, which is the divinely-appointed guardian of the truth.

Though, therefore, we shall keep in mind the inadequacy of our dogmatic, as of all possible logical statements of heavenly truth, though with the great Apostle we shall regard them as but "prophesying in part," yet we shall not try to dispense with them, or value them cheaply, or doubt their practical truth within the limits of their legitimate purpose. And we shall always make a great distinction between them and any further dogmatic statements, or logical divinity, with which we may come in contact. This latter may or may not be valuable, it may or may not be right to insist on its recognition by those who would be authorized teachers in particular places or communities, but it must never be imposed as part of a necessary Christian profession, it must never be made a condition of communion. The œcumenical divinity of the Creeds was and is a necessity, if the truth into which we are baptized is to have a real hold on the whole of our being; all else is subordinate to that truth, and therefore, must be kept subordinate in our estimate of it, and our proceedings with it.

The application, however, of the logical faculty to theological matters cannot be restricted to the Catholic

Creeds. As has been already urged, the exercise of that faculty is not one which can be stilled at its possessor's bidding; and, therefore, though he may make ever so wide a distinction between œcumenical symbols and individual speculation, a man, earnestly occupied with divine truth, must be continually casting such speculation into logical form, both in his own mind and in his outward utterance. Here, I think, there is one caution which may with advantage be kept in mind. From the necessity of the case we must have propositions in themselves most inadequate, but the nearest approach to the truth which we inwardly behold within the reach of outward expression. We cannot dispense with them, but we may perhaps, with advantage, beware of turning any one of their elements into a middle term, and so syllogizing. A word or words may serve legitimate ends in more than one theological statement, and may yet, from the inadequacy of all statements in such matters, be perverted from their true use, if made to draw the two statements together.

The syllogism indeed, as has already been more than once noticed, is often as instantaneously flashed on the mind as are its terms and premisses. In such case it will come into theology by the same necessity as that which gives birth to propositions, and is then to be received and used on the same grounds and with the same cautions. But there is also such a thing as syllogizing of set purpose, and from that it may be safe, as I have just urged, to abstain, even when the terms of admitted propositions would seem to furnish us with the materials. Two propositions may possess a term, serving a legitimate purpose in each, but which though it seems the same in sound, aspect, and mean-

ing, may not really be in all respects the same in the two, seeing that it is inadequate in both. In such case, let us be content to use it in both, without regarding it as a middle connecting them together.

Perhaps applications of this principle will occur at once to most of my readers[5]. Suffice it now to say that it will enable him who acts on it to hold the undoubted truths by which he sees those around him possessed, and to avoid the errors which appear to the others so necessarily to follow from those truths as to be part of the truths themselves; to ascribe, for example, in opposition to Pelagius, the very first beginnings as well as every subsequent stage of good in man to the grace of God, and yet to hold fast by man's free will, and God's universal love and grace; to give all glory to God, without making man mere inert matter in God's hands; to resist error otherwise than by maintaining opposite error, and without diluting the truth from which the error has been wrongfully inferred. Such an one can bear to be taunted with shrinking from consequences where the nature of the premisses leads him to doubt man's faculty of deducing consequences from them, while he will at the same time cling to the premisses themselves as truth; seen thus, indeed, through a glass darkly, but otherwise not, perhaps, seen at all, or seen only by fugitive glimpses, which cannot be detained before the eye that has momentarily caught them, or exhibited to his brethren by the beholder.

[5] If my memory serves me aright, Arius began to propagate his error by syllogizing from the idea of fatherhood.

NOTES.

Note A, p. 44.

The question of Nominalism and Realism, though of older date than the schoolmen, and though I believe it to be the one great question on which thinkers are divided, and the root of all their further divisions, may be best, perhaps, surveyed from a mediæval point of view, that is, from the point of view in which it presented itself to Roscelin and Ockham on the one hand, and their respective opponents on the other.

We all feel at once that a singular term, the name of an individual, has or can have a corresponding reality. If it does not denote a fictitious, it is a sign of a real existence. But is this the case with an universal? Are there such realities as species and genera of which the universal terms are but the signs? When I speak of a horse, there is no doubt I may mean an actual existence, a horse standing before me, and when I speak of horses, I may and do often mean several such horses; but when I speak of the species horse—the kind, is there any corresponding existence? Do I, or can I, mean more than many individual horses, all the horses I know of, and all that I am sure exist, have existed, and are to exist, besides? Roscelin is understood to have denied that I can mean more than this, to have maintained that the universal term is but a name, denoting many individuals. He was met by strong assertions of the reality of kind. In his age the orthodox sentiment regarded his position

of Nominalism as heretical, and Abelard, who was perhaps his pupil, was obliged to disown the imputation of denying the truth of *universalia a parte rei*, which was the Realistic formula. Although the question is for the most part opened by a Dichotomy, and we divide the Schoolmen into Nominalists and Realists, it is requisite that we subdivide. When the Realist asserted the substantial existence of universals, he might be, and he has been, met by more denials than one. His opponents might say, "To the end of all time you will never be able to prove that your universals have any existence over and above the particulars which they group together. We grant you that the mind is obliged thus to group them, and we hold that the universal term is the sign, not of an outward reality, but of the mind's concept, whereby it has thus grouped them." The thinker who takes this ground is called a *Conceptualist*. It is difficult to ascertain the precise position occupied by all the combatants of the Middle Ages. Be these, however, as they may, Hobbes, and after him Berkeley and Hume, have gone to the utmost limits of Nominalism, denying, not merely the independent reality of universals, but even the existence of such concepts in the mind, and considering the universal term as merely a convenient abbreviation whereby a number, or any of a number, of resembling objects can be at once denoted. Like the Milky Way, which seems a white surface, only because "powdered with stars" too numerous to be counted or separately contemplated, the universal term is on this supposition a seeming whole, only because we have not time or capacity to separate and count up the many objects which it groups together; and *species* and *genera* are not, as we should have fancied, the right order, but the *confusions*, of thought.

In this conflict of opinion, where lies the truth? Not certainly with any such Realist of the middle ages as may have asserted a substantial reality in universals, and viewed the individuals as but accidents, which was the first doctrine of William of Champeaux. This is an utter extravagance, and as an extravagance we may dismiss it. But is the pure Nominalistic position one whit less extravagant? Can any man really accept it? Whatever be the external truth of the matter, can any man satisfy himself that it adequately explains the concepts, *universal*, *genus*, *species*? Will any man say that he can content himself with it as an explanation of the universe,

of the law of kind in the organized creation? Can the formula, *universalia post rem*, explain our sense of the unity of a single kind, the dog, for example, or the horse? According to that formula, such seeming unity is produced by each new dog or each new horse, to a considerable extent resembling the aspect and the doings of other dogs and horses, and the organization and the conduct of each dog or horse is in its turn the cause of our imagining the kind dog or the kind horse. Does not every man instinctively reject such an explanation as this? Does not every man instinctively feel what Scripture asserts, that each dog and each horse is made *after* his kind? that his organization and his line of conduct are determined *by* his kind? that his kind is a law upon him, not a deceptive phenomenon which he contributes to produce?

A further and more serious objection remains. Nominalism, as we have seen, was taxed from the first with an heretical tendency; and most assuredly it is hard to reconcile its extreme form with the teaching either of Holy Scripture or the Church Catholic. Read the beginning of John xv.; read Romans v.; and say if meaning will remain to either passage if we adopt the creed of extreme Nominalism. To this subject I must return before concluding. For the present, let it suffice that pure Nominalism creates nothing, destroys all, takes order and law alike from the world around us, and the minds that contemplate it, that it *pulverizes* the universe.

Let us now turn to the intermediate ground of the Conceptualist. He discards the extravagance of the Realist, for he denies the actual objective existence of universals apart from the particulars which compose them. He does not like the Nominalist attempt to explain our concepts in a way which our consciousness tells us is utterly false; for he admits that universals are concepts, and necessary concepts of the mind. So far we feel that we are steering safely, but there is still a wide berth for uncertainty and error.

Conceptualism can take a twofold form. Its advocate may admit that our concepts of genera and species are not explained by the account which is offered by the pure Nominalist; but he may regard them not as the right law, but as the infirmity and limitation of the human mind. He may view them as the ministers of deception, from whom and from which we cannot free ourselves. With a writer of the present day, he may

speak of "the inveterate realism of the human mind." If such be his belief, he must be classed in every essential respect with the Nominalist.

Or he may say that the formation of such concepts as genus and species is a necessity of the human mind, because it is the right way of viewing the universe around us; that the eye is adapted to the objects of sight; that the mind was meant to see truth, and except by rising to universals would see no truth. He may deny that those universals have an independent substantial existence, that they are in themselves *things*, as the several objects ranked under them are things; and yet believe that, except as so ranked under them, those objects cannot be rightly conceived or understood; that the universal exists not as itself *a thing*, but as the unseen fashioner of things; that its existence as a law and a power is implied in each thing; in short, his formula is neither *universalia ante rem* nor *universalia post rem*, but *universalia in re*.

In the first case the Conceptualist must be classed under Nominalism, in the second under Realism. Perhaps those doctors of the middle ages were right who accepted all the three formulæ, *universalia ante rem, universalia in re, universalia post rem*.

Of course some universals are much more arbitrary than others. But the mind makes a great distinction between *genera* and *species*, which it adopts for a temporary and accidental purpose, and those under which it is compelled to view an object at all times. These cannot be regarded as merely arbitrary. In other words, the first three predicables have more necessary reality than the two last.

One great source of confusion on this subject is the difficulty we feel in realizing the notion of a *truth* that is not a primary *substance* or *thing*. The verb substantive is our ordinary copula, and is habitually supposed to assert for one of the terms of a proposition substantial existence. Yet in how many instances does its use vary! We say, "There is such a church as St. Peter's at Rome," and "There is such a disease as the cholera morbus." Has *there is* any thing like the same force in the one case as the other? In the former, beyond all doubt, it attributes external existence to St. Peter's. Surely its use in the latter case is no deception, and yet there cannot be the same attribution of external existence. We should use it and

understand it quite well, even were we sure that there was not at the moment a case of cholera in the world. And yet at no time should we imagine that cholera had a substantial existence antecedent to and apart from cases of cholera. In short, the verb substantive may express existence as a primary substance, and it may also express reality as a power, or law.

Another cause of confusion is the error of supposing the objective world without the subjective, the outward without the inward, things without the faculty which apprehends them. However firmly a man may hold the reality of an external world, he must admit that neither it nor the things it comprises has any meaning for him apart from his own perceiving and conceiving mind.

If then we go so far as the former kind of Conceptualist, and admit the existence of universals in the mind, it is open, I think, to the latter kind to come forward and ask, "If in the mind, why in the mind? In order that the mind may be misled about the world around it, or truly guided to the law and the order of that world? Who created that mind? Who made it the image and likeness of His own perfect mind?" When we view the subject in this light, we shall be led to believe that the essential laws of human thought, instead of being deceptive, are in thorough correspondence with external truth; that the power exercised by Adam of naming the creatures according to their kinds is a sacred faculty given him by the Father of Lights, in order that he may enter into that Father's own law and method, and may see the Universe as He has conceived and planned it.

And more sacred matters than the facts of the outward universe are involved, as I have already intimated, in this great question. I have named two passages of Scripture which can never be reconciled with bare Nominalism. I might have adduced many others; but it is needless to do so, seeing that the whole body is in antagonism to that Creed. If the law of kind be not a truth, what becomes of that view of matters which is *habitual* to the Scriptures, which looks at man generically, pronouncing him the subject of a generic ruin and a generic redemption, and regarding him as born a branch of one Adam, from whom he derives sin and death, and born anew by being engrafted on a second Adam, from whom flow into him righteousness and life eternal.

It needs scarcely be said that the foregoing remarks do not aim at treating the stupendous question which has given rise to them, but merely at presenting the student with a few hints in regard to it, which it may be well for him to keep in mind.

NOTE B, p. 51.

The Indesignate has been regarded as particular when the subject of an accident, from logicians having confined their attention to one view of propositions, in which the whole is regarded merely as an aggregate of the singulars. In this point of view we must either mean that an affirmative predicate is in every singular, or not in every, ἐν παντὶ or only ἐν τινὶ, or *vice versâ*. But I contend that the aggregate of singulars is not the only aspect under which a genus presents itself to the mind; that it is often thought of apart from any distinct view of its component parts, and that this is generally the case when we express ourselves by means of an Indesignate. The "Port Royal Logic" with great justice views the Indesignate rather as a singular than as a particular, the genus presenting itself to the mind, not as made up of the aggregate of co-ordinate parts, but as an unit. In the example in the text, *Cherries are ripe*, Cherries = the kind *Cherry*, without reference to the individual cherries which may be in existence, and as thus no parts are taken account of, the term may be viewed as singular, and therefore answering like other singulars in its bearing on reasoning to the universal. That such predicates are not particular is shown in the "Port Royal Logic," by comparing them with propositions regarding the same matter which undeniably are. We say that *the French* (Frenchmen) *are brave*, that the *Italians are jealous, the Germans are tall, the Orientals are voluptuous;* but who would admit such assertions as that *Bears are white, Men are black, Parisians are gentlemen, Poles are Socinians? Some bears are white, some men are black*, &c., are particular propositions incontestably true, but we feel at once that they are not expressed without the mark of particularity, *some*, or an equivalent. The others, then, "The French are brave, &c.," are really universal, and Indesignates are such in any matter,

"mais dans une matière contingente on se content d'une universalité morale."—"La Logique, ou l'Art de Penser," c. iii.

Indesignates, then, are to be regarded as singulars, and so far as universals, even when their predicates, being accidents, necessarily involve a possibility of exceptions to their application. Of course the facts on which we found such judgments may be stated as particular propositions. The facts on which I ground my conviction that "the French are brave," may be both thought and stated by me in the form "Some Frenchmen are brave;" but the latter, I contend, is a different judgment from the former. "Some Frenchmen are fat," would never warrant my saying "the French are fat."

This being so, let us see how the case stands with the syllogism which I pledged myself to consider at p. 51.

Cherries are ripe.
These are cherries.
∴ These are ripe.

Here there is an ambiguous middle, for *Cherries* in the Major is an Indesignate term, i.e. singular; and Cherries in the Minor is an undistributed predicate, i.e. particular. The syllogism is therefore invalid. The following is a good specimen of syllogizing with an Indesignate premiss:—

Fruit that is ripe at this season may be safely eaten.
Cherries are ripe at this season.
∴ Cherries may be safely eaten.

Here there is an Indesignate minor and an Indesignate conclusion, both according to the "Port Royal Logic," to be viewed as singulars; and the whole syllogism is an ordinary one in *Barbara*.

Note C, p. 68.

THE VARIETIES OF LOGICAL QUANTITY.

This subject seems to me entitled to further consideration than it has generally received. The great division of Logical Quantity is into the Universal and the Particular, better designated the Definite and Indefinite; but these take a variety of forms which has not yet I think been fully exhibited.

The Universal or Definite contains the following—

1st. All the A's, } these the
Each or every—every A, } same.

2nd. The whole, the whole class A.

3rd. The Indesignate A's.

4th. The individual A.

5th. The defined fraction of any thing, the half, the quarter, &c. This falls under the head of the individual.

7th. *Very many*, or *by far the most*, and *few* in certain cases, the one being the positive and the other the negative, the one meaning *all* with a qualification, the other *none* with a qualification. *Very many* has for its equivalents, *for the most part, the great majority, very often. Few* has, *scarcely any, seldom, scarcely ever*, &c.

The Particular or Indefinite takes the following forms.

1st. *Some.*

2nd. *Many*—denoting a considerable number, but not so far as is stated or thought approaching universality.

3nd. Few—the negative of many.

4th. A few—a positive term.

Of these Many and Few, or *a few* demand the most consideration. When I affirm something of many specimens of a kind, but give no intensitive force to *many*, do not mean *very many*, or *by far the most*, but only a number which may be regarded as considerable, and such as should preclude any surprise on encountering the phenomenon in question, then I seem to be enouncing a particular or indefinite proposition. In truth, however, whether *many* or *few* be used in this way, they will often be found to be predicates, as is shown by the emphasis with which we pronounce them. What we really mean is that the cases in question are *many* or are *few*.

When, however, *many* is a subject, it will either mean, as has been said, *all with a qualification*, or be equivalent to *a considerable number*, in which latter case, according to my present opinion, it will be a singular or unit. *Few* in both cases will be its negative. As affirmative and negative, *many* and *few* will conform to the ordinary rules of the syllogism.

E. g. I can say in Fig. 1.

All asthmatic people have enlarged air cells.

Many strong built people are asthmatic.

Many strong built people have enlarged air cells.

But I cannot say,

All asthmatic people have enlarged air cells.
Few slightly made people are asthmatic (if the case be so).
∴ Few slightly made people have enlarged air cells.

And why? Because few thus used is the negative of many, and the rules of syllogism demand that the minor premiss in Fig. I. (in the ordinary expression of thought) be affirmative. *Few slightly made people* means here *not many* slightly made people.

So in Fig. II. I can say—

All asthmatic people have enlarged air cells,
Few slightly made people have enlarged air tubes (if the case be so),
∴ Few slightly made people are asthmatic,—

in complete accordance with the rules of that figure which demands in ordinary expression a negative conclusion, while because of the same rules, I cannot say,—

All asthmatical people have enlarged air tubes.
Many strongly built people have enlarged air tubes.
∴ Many strongly built people are asthmatic.

Thus *many* and *few* follow in the syllogism the rules which apply to *all* and *none*.

Note D, p. 109.

The special rules usually laid down for the figures with the demonstrations of their necessity are worth considering, both in their relation to the ordinary expression of Thought, and as an exhibition of the change which Logic has undergone in the hands of its recent prosecutors.

Confining ourselves to the first three Figures alone recognized by Aristotle, those rules are as follows:—

Fig. I.	The Major must be universal.
	The Minor must be affirmative.
Fig. II.	The Major must be universal.
	One premiss must be negative.
Fig. III.	The Minor must be affirmative.

Now confining ourselves, as we must, to propositions *de Inesse,* which were alone contemplated when those rules were fixed, and taking for axioms the old doctrine that in affirmative propositions the predicate is always undistributed and in negative distributed, and the six general rules of Syllogism given in pp. 101, 102, we can demonstrate the certainty of those rules as rigidly as we can any proposition in Euclid. Let us take for an example Rule II. for Figure I., that the Minor must be affirmative.

This will follow, if the Major be negative, by the fifth general rule; but if the Major be affirmative, then the Minor must be affirmative also; because, if it were negative, the conclusion by the sixth general rule must be negative. Its predicate, therefore, must be distributed. But that predicate must be the Major term which in the first figure is the predicate of the Major premiss, which by hypothesis is undistributed. Therefore there would be in the conclusion an illicit process of the Major. Therefore the Minor must be affirmative. Q. E. D.

Note E.

Although the difference of the figures is but accidental, that is, though the essential principle of all reasoning is one, those differences are worth considering. Why is it that we are led to throw our reasoning into one figure more than another? It is enough in many cases to say that we are thus determined by our context—the context, whether of mere thought in the mind, or of our uttered discourse. Such context has so presented the terms that we are directed to one rather than any of the other figures. But our adoption of a particular figure may be the result of our purpose, of the point which we wish to establish, and the adaptation of the figures to different purposes, which Lambert has suggested, but which he has not very successfully elucidated, deserves some little attention.

In bestowing this let us keep in mind *the essence* of syllogism. That consists in the comparison of two terms with a third, and by means of that with each other.

It is but one class of syllogisms which concludes of any thing that it is or is not within the sphere of a containing, according as it is or is not within the sphere of a contained,

whole. This, which used to be considered the *syllogism*, is but one species of a larger genus, and so long as our reasoning rests on the laws of Identity and Contradiction, there is no need of exhibiting it under that of *de omni et nullo*, however capable of being thus exhibited.

It is the clearness of such exhibition which gives its peculiar grace to the first figure, and it might therefore be thought that it would be the one of most frequent occurrence in reasoning, whenever at least that consisted of judgments *de Inesse*. I suspect, however, that we comparatively seldom reason explicitly *in the first instance* in this figure. When our uttered or mental context leads us to it, we shall generally find it veiled in the Enthymeme. The reason of this is plain on a little consideration. It is seldom that two related propositions *de Inesse* require consideration at the same time. One of them—the major or minor—will constantly be too obvious to need being stated, or else already known and admitted.

We shall be naturally thrown on the second figure when we wish to discriminate, to hinder one set of cases being confounded with another. When such is our aim we shall naturally emphasize the point wherein the distinction consists, which is the inherence of a predicate in the one case, and the exclusion of the same predicate from the other, and this is markedly done by the quick repetition of that predicate as the middle term.

The third figure strikes me as the most useful of all. It is that which in the affirmative exhibits Compatibility. Throwing its subject into the middle term, it exhibits two predicates as coinciding in the same matter. Colligation is therefore more easily attained by this figure than by either of the others, and a comprehensive result. It is consequently the natural shape of Inductive reasoning. It should be observed that it enables us to bind together as predicates of the same subject not merely two different qualities or attributes, but concepts belonging to two different spheres of thought, e.g. the instance given in § 15, where we colligate the mark A and the class B.

It is a peculiarity of this figure that it can avail itself more largely of singulars or indesignates (which are really singulars) than the others. In the first, the major premiss cannot have a singular or indefinite subject, though the minor can. In the

second we have a somewhat greater command of this kind of term. For example, we can argue that since Frenchmen are gay and Belgians are not, they are not the same people. But in the third, the middle, which is the subject of both premisses, may always be either a singular or an indesignate. The compatibility, for example, of humour with philosophy may always be argued from the attribution of both to a single man, such as Socrates; the compatibility of gaiety with courage, from the attribution of both to a single people, such as the French.

In the negative form, the third figure enables us to protect ourselves against consequences from an admission, e. g.

Felapton—

No Englishmen are mercurial.
All Englishmen are humorous.
∴ Some humorous are not mercurial.

Here my assertion about one of the terms of the conclusion might be held to tie me down to the other, but the syllogism just given liberates me from the consequence.

This plainly helps Inductive inquiry by putting in our power *the rejection of a nature.* It is clear from the case of Englishmen that the mercurial temperament is not the cause of humour.

The fourth figure seems to me, *pace Lamberti,* altogether useless, nay, I hold with J. Pacius that it is not a figure at all. For it is the premisses that constitute the syllogism, and syllogisms, as Aristotle shows (Analyt. Pr. II. 1) may have more conclusions than one. In fact, a syllogism gives birth to every conclusion which follows from the natural one by Immediate Influence. Now the conclusion in the fourth so-called figure is always the converse of that which we should get from the same premisses arranged in the first. This is obvious in *Bramantip, Camenes,* and *Dimaris,* and may be seen in *Fesapo* and *Fresison,* which in this case will give us not *Ferio,* but if we quantify the predicate, the former AEE, and the latter the unjustly condemned IEO. As regards the premisses, their relative position, whereby the middle is predicate of the major, and subject of the minor, is a mere accident in statement which may be removed at pleasure;[1] and then we have

[1] In fact the minor seems to have for a good while been generally placed first, as soon as the subject began to be so.

simply the old indirect moods of the first, *Baralipton*, *Frisesmo*, &c.

In truth, a converted conclusion is the result of transposing the premisses of any syllogism whatever. *Camestres* stands in precisely the same relation to *Cesare*, and Datisi to Disamis, as do *Bramantip* to *Barbara*, and *Camenes* to *Celarent*, only in the second and third figures the position of the middle is not affected by transposition of the premisses, and hence no seeming diversity of figure is produced. The fourth only seemingly, then, differs from the first. By transposing the premisses, we turn the major into the minor, and *vice versâ*, and from this a converted conclusion must ensue, apparent in some cases, and in all to be detected by quantification of the predicate. Such converted conclusion, however, could always be procured, if desired, by immediate inference without the trouble of transposition.

Note F.

I subjoin a small Vocabulary of words in common use, which have their origin either in Logical or in kindred Philosophy. It admits, as will easily be seen, of much enlargement.

Category.—The Categories have been explained in the text. The primary meaning of the word *κατηγορία*, as stated there, is *Accusation*. The verb *κατηγορέω* seems likewise to have had the force of *indicate*, *tell of* (see Liddell and Scott, in voc.); and finally in Logic it meant to *predicate*. In connexion with this technical use, *κατηγορία*, *Category* is used in the *Organon* to denote a summum genus of conception. In one or other of the ten Categories must all predication be made. In the present day the word is employed abusively as a synonym for *class*, *kind*. I imagine this use, foreign at once to the primary and the technical sense of the word, to be very modern, and such as may still well be avoided. See Predicament.

Common-place.—In the *Organon* of Aristotle, the eight books on the *Topics* occupy an important place. Their subject is that of *τόποι*, *places*—propositions which being agreed on on all hands, may be considered *seats* of argument. These *τόποι* are the same with *maxims*, and, preserving their first name, with *loci communes*. Great stress was laid, up to the seventeenth century inclusive, on collecting and registering *common-*

places. Some of the Schoolmen distinguished between the maxim and the *locus*, designating by the latter term the class to which the maxim belongs. The *locus* of *semper cuilibet in arte suâ credendum est* is *Testimonium.* This distinction, however, is unknown to Aristotle, with whom the τόπος is always a proposition. Mansel's Aldrich, note, pp. 114, 115. Hence the phrase "Common-place book." I apprehend the modern adjectival force of the word, as synonymous with ordinary or common, to be of but recent origin. Johnson, in his Dictionary, gives it neither as substantive nor adjective, but uses it himself, as Todd notices, in his criticism on Gray :— "The ensuing stanza, exhibiting Mars' car and Jove's eagle, is unworthy of notice. Criticism disdains chasing the schoolboy to his *common-places.*" Here it is still the substantive, though it has broken loose from its Aristotelian meaning. Todd himself takes no notice of the adjective, which, as I have already said, I am disposed to think of very recent date. See MAXIM, TOPIC.

DIAMETRICALLY OPPOSITE.—As the length of the diameter is the greatest distance within the square or parallelogram, it might naturally enough present itself as a figure of complete opposition. It probably, however, originated in tables of logical opposition, the most marked degrees of which stood diagonally apart. Aristotle, who seems to have drawn such a table, speaks of the oppositions κατὰ διάμετρον. *De Int.* c. 10. But these with him appear to have been the contraries, not as with us, the contra-dictories, And though the latter give us a more peremptory opposition than the former, though between A and O no intermediate ground is possible, yet A and E stand farther asunder. The assertion that "some vegetables are unwholesome," is only the contradiction of the assertion that "all vegetables are wholesome:" but the assertion that "no vegetables are wholesome" would in Aristotle's table have been *diametrically opposite* to it.

Whilst on the subject of opposition, I take the opportunity of referring to a point which ought to have been dealt with in the body of this work—the *opposition of singulars.* This stands outside the received Table, which contemplates only universals and their subalterns. In the case of singulars the distinction between contraries and contradictories seems to disappear. E. g. *Cæsar was good—Cæsar was not good.* The

latter proposition is obviously the contradictory of the former, coming under the Aristotelian definition of contradiction as having no middle interposed. At the same time it is the only apparent contrary, and as, taking singulars for universals, the former must be symbolized as A, so must be the latter as E. But if we attach the notion of quantity to the predicates, we then get a Table of Opposition exactly corresponding to the Ordinary—thus:

Cæsar was entirely good	A.	E. Cæsar was not good at all.
Cæsar was partly good	I.	O. Cæsar was not entirely good.

ESPECIAL.—See SPECIAL.

FORM.—The philosophical meaning of this word belongs rather to Metaphysics than to Logic, but as the latter has been defined to be "the science of formal thought," some consideration of this term may not be out of place here.

The *Form*, εἶδος, of any thing is that which constitutes it what it is, and when applied to species is identical with the *differentia* and genus combined, only, as has been said, it is used in the Metaphysical rather than the Logical consideration of any given nature. The matter of any thing, whether spiritual or corporeal, constitutes nothing till it receives form. The formal cause is therefore that which determines any thing in its distinct being.

Now, in ordinary modern language, *Form* is used rather in contradistinction to that which is real; a use almost the *opposite* to the philosophical, in which latter the *Form* is nearly equivalent to the essence. The employment of the term by Bacon, as identical in meaning with the *vera differentia* and the *natura naturans*, is in accordance with this.

The difference between the modern conversational and the philosophical employment of the term will appear in this. Supposing we were trying to explain of any adherent of an heretical doctrine, that he was so only by accident, and in mere outward avowal, but not really and in spirit, we should be very apt to say that he was only a heretic in form, but not in reality. Whereas the language of Scholastic Theology would say that he was materially but not formally an heretic. Material heresy, or material schism, consists in the outward avowal of the outward act, which respectively constitutes the matter of the heresy or the schism; formal heresy and formal

schism, in the real action of the will and spirit. Many of the Homoiousians of the fourth century were in material, but not in formal heresy. A charitable Churchman will regard many separatists as materially but not formally in schism.

The true force of the word comes out clearly in the following:—

> "Anzi è *formale* ad esto beato esse
> Tenersi dentro alla divina voglia,
> Perch'una fansi nostre voglie stesse."
>
> *Dante*, Paradiso, III.

GENERIC, GENERAL, } These words both come from *genus*, in its philosophical sense.

A slight deflection from its strict force seems to have taken place in ordinary use of the word *general* and its grammatical kindred. *Generally* and *in general* seem, in ordinary talk, *proprio vigore*, to denote *the most*, to the exclusion of *all*. Whereas in their true sense they are universal, and have only acquired the force of *most* from our frequent implicit recognition of the fact that whereas a property may be predicated of a whole genus, there are yet some specimens of such genus which stand out as marked exceptions. What we say of the *generality* we say universally, the exceptions being allowed for, and our predication is understood to be of every thing in the genus except them.

The distinction between *general*, *generally*, and *for the most part*, with which modern use confounds the former, will be found of importance in the study of the Church Catechism. When the catechumen answers the question, "How many sacraments hath Christ ordained in His Church?" with the words, "Two only as *generally* necessary to salvation," it is probable that he, and frequently the catechiser, understand the adverb *generally* as meaning *ordinarily*, but not *universally*. The allowance which we are sure will be made for non-reception of either or both the sacraments, because of unavoidable circumstances, or blameless error, is not probably the point contemplated in the Catechism. Its assertion is, I suspect, one of fullest universality. We shall understand its force if we couple it with a specialty. Baptism and the Supper of the Lord are *generally* necessary to salvation; keeping his ordination engagements are *especially* necessary to the clergyman's salvation.

INDIVIDUAL.—The atom or unit as distinguished from the special or general. The vulgar use of this word, as synonymous with *person, human being,* is always to be avoided.

MAXIM.—This term, with which we are all so familiar, is of purely philosophical origin. The *τόποι*, or *places*, of Aristotle, the *loci communes* of the Latins, were called by Boethius the *maximæ propositiones:* also, *propositiones supremæ, principales, indemonstrabiles, per se notæ,* which being admitted on all hands, were capable of serving as premisses in reasoning. "Maximas propositiones vocamus quæ et universales sunt, et ita notæ atque manifestæ, ut probatione non egeant, eaque potius quæ in dubitatione sunt probent." Passing into the hands of the schoolmen, the substantive *propositio* was soon dropped, and the adjective came to be used substantively as a recognized term of art; the same thing having more or less contemporaneously occurred among the Greek logicians, with whom the *μέγισται προτάσεις* became simply *μέγισται.*

The above, with further information on the matter, will be found in Hamilton's Reid, p. 766, and in Mansel's Aldrich, p. 99, in notes by the respective editors.

PREDICAMENT.—*Predicamentum* is the Latin equivalent for Category. In the first edition, at this place, I referred to an exposition of Aristotle's Categories among the spurious works of St. Augustine, under the impression that the word *predicamentum* is employed there. I see, however, that my memory proved treacherous. *Categoria* is the title given. In the ordinary language, however, of the Latins, the *ten predicaments* mean the *ten categories.* In modern conversation (I suppose scarcely in writing) the word has acquired the sense of *disagreeable situation.* A *predicament* is used to denote *a scrape.* When or how this arose, it may be difficult to say. Shakespeare, in the "Merchant of Venice," uses the word in a sense somewhat intermediate to its technical and its modern colloquial signification:—

> "In which *predicament* I say thou stand'st."

In French, *predicament* is conversationally used, as with us, in the sense of *situation,* but equally for a pleasant and an unpleasant one.

QUALITY, QUANTITY.—These words, though common in modern conversation, are in their origin wholly scientific. Cicero accompanies his employment of the former with a sort of apology (Acad. i. 6, 7). He states it to be, as it is, the translation of the Greek ποιότης, which he says is also a philosophical word, not one of ordinary life. The latter is the commoner in modern conversation of the two, and is there sometimes abusively employed to denote, not *any quantity* but *a great one*. In the true use of the word, the smallest is as much a *quantity* as the largest amount of any thing.

SENTENCE.—From the Latin *Sententia*, an *opinion*, a *judgment;* a term, however, not necessarily philosophical, as we find it as far back as Terence. Hence the decision of a court of justice is called its *sentence*, and a criminal is said to be *sentenced* to his allotted punishment. Had the etymology taken free course, we might quite as well have said that the man whose guilt is not proved is *sentenced* to acquittal.

Hence, too, as has been remarked in the text, a grammatical period is called a *sentence*, because every grammatical period consists of *a* judgment or proposition, whether its clauses do or do not contain subordinate ones.

SPECIAL, ESPECIAL.—Of or belonging to the species, as general means of or belonging to the genus. The two forms, without and with the vowel E at the beginning, are worthy of note, as one of the few remains of the Italian rule respecting S impure, which doubtless once had greater sway over our language than now.

TERM.—From *Terminus*, the ἄκρον of a proposition.

TOPIC.—See COMMON-PLACE, MAXIM.

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